

(NASA-SP-7043(01)) ENERGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, MAY 1974 (NASA) 78-P HC \$4.00 CSCL 10A

N74-30378

Unclas 00/34 54820

ENERGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

MAY 1974



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

IAA (A-10000 Series)

A74-10001—A74-19205

STAR (N-10000 Series)

N74-10001-N74-15699

Previous publications announced in this series/subject category include:

Energy: A Special Bibliography NASA SP-7042

(Coverage Jan. 1, 1968 through Dec. 31, 1973)

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Tisco, Inc.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through July 1, 1974.

1. Report No. NASA SP-7043 (01)	2. Government Accession	7 No.	3. Recipient's Catalog	No.
4. Title and Subtitle ENERGY			5. Report Date May 1974	
A Continuing Bibliography	y (Supplement	01)	3. Performing Organiza	ation Code
7. Author(s)			8. Performing Organiza	tion Report No.
		11	0, Work Unit No.	
), Performing Organization Name and Address		·		
National Aeronautics and Space Adminis Washington, D.C. 20546		tration 1	1. Contract or Grant (No.
		1	3. Type of Report and	d Period Covered
2. Sponsoring Agency Name and Address				
•		1	4. Spansoring Agency	Code
5. Supplementary Notes			~	
6. Abstract				
). Absuract				
into infor	the NASA scier	r documents int ntific and tech from January 1 1974.	nical	,
•				
		•		
			-	
e e	•			
		<u>.</u>		
7. Key Words (Suggested by Author(s))	i	18. Distribution Statement		
Bibliographies W Energy Conversion Energy Policy Solar Energy	ind Energy	Unclassified - Unlimited		
9. Security Classif. (of this report)	20. Security Classif. (of	f this page)	21. No. of Pages	22. Price*
Unclassified	Unclassi	fied	78	\$4.00

ENERGY

A Continuing Bibliography With Indexes Supplement 01

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced from January 1, 1974 through March 31, 1974 in:

- Scientific and Technical Aerospace Reports (STAR)
- International Aerospace Abstracts (IAA).



This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22151, for \$4.00. For copies mailed to addresses outside the United States, add \$2.50 per copy for handling and postage.

INTRODUCTION

This is the first issue of a new quarterly publication, Energy: A Continuing Bibliography with Indexes (NASA SP-7043). It lists 232 reports, journal articles, and other documents originally announced between January 1, 1974 and March 31, 1974 in Scientific and Technical Aerospace Reports (STAR) or in International Aerospace Abstracts (IAA). An earlier publication, Energy: A Special Bibliography with Indexes (NASA SP-7042) cited the documents announced in the same abstract journals from January 1968 through December 1973.

The coverage includes regional, national and international energy systems; research and development on fuels and other sources of energy; energy conversion, transport, transmission, distribution and storage, with special emphasis on use of hydrogen and of solar energy. Also included are methods of locating or using new energy resources. Of special interest is energy for heating, lighting, for powering aircraft, surface vehicles, or other machinery.

Each entry in the bibliography consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections, IAA Entries and STAR Entries, in that order. The citation, and abstracts when available, are reproduced exactly as they appeared originally in IAA or STAR, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money accounts for the slight variation in citation appearances.

Five indexes-subject, personal author, corporate source, contract number, and report number are included. The indexes are of the cumulating type throughout the year, with the fourth quarterly publication containing abstracts for the fourth quarter and index references for the four quarterly publications.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A74-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service. American Institute of Aeronautics and Astronautics, Inc., (AIAA), as follows: Paper copies are available at \$5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche ⁽¹⁾ are available at the rate of \$1.00 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is \$1.00. Please refer to the accession number, e.g., A74-11072, when requesting publications.

STAR ENTRIES (N74-10000 Series)

A source from which a publication abstracted in this Section is available to the public is ordinarily given on the last line of the citation, e.g., Avail: NTIS. The following are the most commonly indicated sources (full addresses of these organizations are listed at the end of this introduction):

Avail: NTIS. Sold by the National Technical Information Service at the price shown in the citation. If no price is shown in a current STAR citation, it may be ascertained by referring to Government Reports Announcements or to NTIS. Beginning with documents announced in Issue 21, 1973, "stocked" reports, such as printed NASA reports are priced on a step schedule ranging irregularly from \$2.75 for a 1-to-25 page report to \$10.75 for 576 to 600 pages, plus \$2.00 for each additional 100-page increment. Demand print reports (those for which a facsimile reproduction will be made to fill orders) are priced at \$3.00 for the first 20 pages plus 25 cents for each five pages or portions thereof. These prices are not applied retroactively; i.e., reports previously announced at a certain price continue to be sold at that price. If "Avail: NTIS" without a price appeared in the citation of a NASA report (asterisked) it is sold at \$3.00 whether printed copy or facsimile is supplied. Because of price changes and possible surcharges, it is recommended that for any document announced in STAR before July 1970, NTIS be queried as to the price. Document prices are subject to change without notice. See "Avail: SOD" below for documents available from both the Superintendent of Documents and NTIS.

Microfiche. Microfiche is available from NTIS at a standard price of \$1,4,5 (regardless of age) for those documents identified by the # sign following the accession number (e.g., N74-10036#) and having an NTIS availability shown in the citation. Standing orders for microfiche of (1) the full collection of NTIS-available documents announced in STAR with the # symbol, (2) NASA reports only (identified by an asterisk (*)), (3) NASA-accessioned non-NASA reports only (for those who wish to maintain an integrated microfiche file of aerospace documents by the "N" accession number), or (4) any of these classes within one or more STAR categories, also may be placed with NTIS at greatly reduced prices per title (e.g., 45 cents) over individual requests. Inquiries concerning NTIS Selective Categories

⁽¹⁾ A microfiche is a transparent sheet of film, 105 x 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 24:1 reduction).

in Microfiche should be addressed to the Subscription Unit, National Technical Information Service

Deposit Accounts and Customers Outside U.S. NTIS encourages its customers to open deposit accounts to facilitate the purchase of its documents now that prices vary so greatly.

NTIS customers outside the United States are reminded that they should add the following handling and postage charges to the standard or announced prices: hard (paper) copy, \$2.50 each document; microfiche, \$1.50 each document. For subscribers outside the United States who receive microfiche through the Selective Categories in Microfiche program, NTIS will add 15 cents for each title shipped.

- Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The price is given following the availability line. (An order received by NTIS for one of these documents will be filled at the SOD price if hard copy is requested. NTIS will also fill microfiche requests, at the standard \$1.45 price, for those documents identified by a # symbol.)
- Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the Mississippi Test Facility, and the NASA Pasadena Office at the Jet Propulsion Laboratory.
- Avail: NASA Scientific and Technical Information Office. Documents with this availability are usually news releases or informational brochures available without charge in paper copy.
- Avail: AEC Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of U.S. Atomic Energy Commission reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the USAEC and its depositories are described in a booklet, *Science Information Available from the Atomic Energy Commission* (TID-4550), which may be obtained without charge from the USAEC Technical Information Center.
- Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts*, and are sold by University Microfilms as xerographic copy (HC) at \$10.00 each and microfilm at \$4.00 each, regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.
- Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc., (PHI), Redwood City, California. The U.S. price (including a service charge) is given, or a conversion table may be obtained from PHI.
- Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown (If none is given, inquiry should be addressed to BLL).
- Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).
- Avail: Issuing Activity, or Corporate Author, or no indication of availability: Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.
- Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of \$.50 each, postage free.
- Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

GENERAL AVAILABILITY

All publications abstracted in this bibliography are available to the public through the sources as indicated in the STAR Entries and IAA Entries sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

SUBSCRIPTION AVAILABILITY

This publication is available on subscription from the National Technical Information Service (NTIS). The annual subscription rate for the quarterly supplement is \$15.00. All questions relating to subscriptions should be referred to the NTIS.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y., 10017

British Library Lending Division. Boston Spa, Wetherby, Yorkshire, England

Commissioner of Patents U.S. Patent Office Washington, D.C. 20231

Engineering Sciences Data Unit Ltd. 251–259 Regent Street London W1R 7AD, England

ESRO/ELDO Space Documentation Service European Space Research Organization 114, av. Charles de Gaulle 92-Nauilly-sur-Seine, France

Her Majesty's Stationery Office P.O. Box 569, S.E. 1 London, England

NASA Scientific and Technical Information Facility P.O. Box 33 College Park, Maryland 20740

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Technical Information Service Springfield, Virginia 22151

Pendragon House, Inc. 899 Broadway Avenue Redwood City, California 94063

Superintendent of Documents U.S. Government Printing Office Washington, D.C. 20402

University Microfilms, Inc. A Xerox Company 300 North Zeeb Road Ann Arbor, Michigan 48106

University Microfilms, Inc Tylers Green London, England

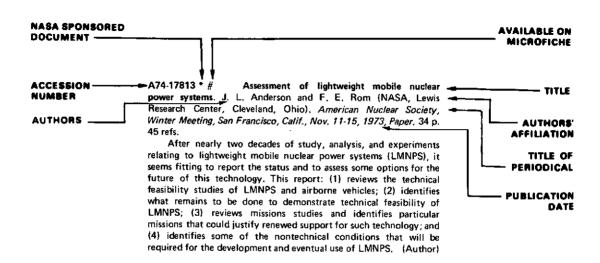
U.S. Atomic Energy Commission Technical Information Center P.O. Box 62 Oak Ridge, Tennessee 37830

Zentralstelle für Luftfahrtdokumentation und-Information 8 München 86 Postfach 880 Federal Republic of Germany

TABLE OF CONTENTS

		Page
IAA Entries	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · ·
SUBJECT INDEX		Δ.1
PERSONAL AUTHOR	INDEX · · · · · · · · · · · · · · · · · · ·	R ₋ 1
CORPORATE SOURCE	INDEX	
CONTRACT NUMBER	INDEX	
REPORT/ACCESSION	NUMBER INDEX	E-1
NASA SPONSORED DOCUMENT		AVAILABLE ON MICROFICHE
ACCESSION NUMBER	➤ N74-14093*# Kansas Univ. Center for Research, Inc., Law	CORPORATE
	- RESEARCH ON THE APPLICATION OF SATELLITE REMOTE SENSING TO LOCAL, STATE, REGIONAL, AND NATIONAL	
TITLE	PROGRAMS INVOLVED WITH RESOURCE MANAGEMENT	
	AND ENVIRONMENTAL QUALITY Semiannual Progress Report, Apr Sep. 1973	
,	Robert L. Walters, Robert J. Eastmond, and B. G. Barr Sep.	
	1973 69 p refs (Grant NGL-17-004-024)	PUBLICATION DATE
AUTHOR ————	(NASA-CR-136472) Avail: NTIS HC \$5.50 CSCL 08F	AVAILABILITY
i i	Project summaries and project reports are presented in the area of satellite remote sensing as applied to local, regional,	SOURCE
CONTRACT	and national environmental programs. Projects reports include:	
OR GRANT	(1) Douglas County applications program; (2) vegetation damage and heavy metal concentration in new lead belt; (3) evaluating	COSATI
050007	reclamation of strip-mined land; (4) remote sensing applied to	CODE
REPORT-	land use planning at Clinton Reservoir; and (5) detailed land use mapping in Kansas City, Kansas. K.M.M.	•

TYPICAL CITATION AND ABSTRACT FROM /AA



A Listing of Energy Bibliographies Contained In This Publication:

- 1. Energy: Compiled Bibliography and Tables of World Resources, Consumption, and Wastes N74-10391 p0010
- 2. Energy R and D Inventory Data Base. Bibliography, 1973

N74-11849 p0017

3. Selected List of Bureau of Mines Publications on Petroleum and Natural Gas, 1961-1970 N74-15691 p0032

NASA -

ENERGY

A Continuing Bibliography (Suppl. 01)

MAY 1974

IAA ENTRIES

A74-10026 Theoretical performance of cylindrical parabolic solar concentrators. K.-E. Hassan and M. F. El-Refaie (Cairo, University, Cairo, Egypt). Solar Energy, vol. 15, Sept. 1973, p. 219-244.

A74-10144 The technology and economics of commercial airplane design. I. J. E. Steiner (Boeing Co., Commercial Airplane Group, Renton, Wash.). Esso Air World, vol. 25, no. 5, 1973, p. 119-124

Discussion of the relation between technology and economics in commercial aviation. Past and present priority orders of aircraft market requirements in speed, range, frequency, quietness, passenger comfort and economics are compared. Direct operating cost trends, aerodynamic efficiency trends, thrust-to-weight growth, engine fuel efficiency trends, payload efficiency, airline revenues vs passenger yield, progress in takeoff noise reduction, return on investment, and approach noise are covered. Improved technology, two-man crew, reduced block time and maintenance cost, and communality/facilities compatibility are listed as elements of improved commercial aircraft design economics.

A74-10463 # Heating of a substance by an arc plasma (Plazmenno-dugovoi nagrev veshchestva). A. V. Nikolaev. In: Plasma processes in metallurgy and in the technology of inorganic materials.

Moscow, Izdatel'stvo Nauka, 1973, p. 20-32. 21

refs. In Russian.

The energetic characteristics of the heating process are analyzed for the heating of the vaporized and condensed phases of substances within and outside the electrical field of an arc discharge. It is shown that the heating of substances by an arc discharge plasma has a potential as a technique for practical electric-thermal energy conversion. It is also found that the power delivered to the substance can be controlled within large limits by varying the electrical parameters of the arc and the thermophysical properties of the plasma arc gas when this electric-to-thermal energy conversion process is used. An efficiency in excess of 80% is indicated for this energy conversion method.

V.Z.

A74-10691 # Physical behaviour of some biowaste gases in an ion engine. A. R. Martin (City University, London, England). American Institute of Aeronautics and Astronautics, Electric Propulsion Conference, 10th, Lake Tahoe, Nev., Oct. 31-Nov. 2, 1973,

Paper 73-1113. 7 p. 12 refs. Members, \$1.50; nonmembers, \$2.00. Research supported by the Science Research Council and Department of Trade and Industry.

The operation of a 100 mm diameter electron-bombardment ion engine using carbon dioxide, methane and nitrogen propellants was studied. The engine was of modern configurational design, but constructed to laboratory requirements rather than flight or engineering standards. The operation with nitrogen and methane was quite similar, and resulted in stable operation with reasonable efficiencies. Operation with carbon dioxide was anomalous, in that as utilization was increased a point occurred where the losses rose and the beam current fell. This was thought to be related to a change in the cathode work function as a result of oxygen poisioning. (Author)

A74-11020 # Satellite solar power stations to meet future energy demands. P. E. Glaser (Arthur D. Little, Inc., Cambridge, Mass.). *Industries Atomiques et Spatiales*, vol. 17, July-Aug. 1973, p. 77-95, 16 refs. In English and French.

A satellite solar power system (SSPS) can be designed to generate electrical power on earth at specific levels ranging from about 3000 to 15,000 megawatt. Over this range of power output the orbiting portion of the SSPS exhibits the best power-to-weight characteristics. Additional solar collector arrays and antennas could be added to establish an SSPS system at a desired orbital location. With the receiving antenna placed either on land or on platforms over water near major load centers and tied into a power transmission grid, power could be delivered to almost any desired geographic location.

A74-11219 # Gas generators - A perspective. W. H. Cutler (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.). American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1168. 7 p. Members, \$1.50; nonmembers, \$2.00.

The gas generator is usually thought of as a light weight, high power, short duration energy source, used mainly in aircraft and missiles. This premise is re-examined by viewing gas generators in the perspective of other energy sources with similar or overlapping characteristics and applications, to see where gas generators have a performance edge and where gaps exist which are opportunities for new gas generator applications. The alternative energy sources, which in addition to gas generators include gas turbines, reciprocating engines, compressed gas containers and hydraulic accumulators, flywheels, batteries, fuel cells, and solar photovoltaic cells, are first described in terms of their energy conversion process and the form in which their output energy is delivered. They are then compared on the basis of stored energy density and applicable power levels. Next, the factors involved in matching an energy source to its operating environment are enumerated. Finally, a number of new applications for gas generators are suggested which introduce new requirements in both technical and marketing areas.

A74-11257 # Solid state hydrogen gas generator. W. H. Barber, W. F. Beckert, and O. H. Dengel (U.S. Navy, Naval Ordnance Station, Indian Head, Md.). American Institute of Aeronautics and

Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1232, 4 p. Members, \$1.50; nonmembers, \$2.00.

A family of light-weight solid state hydrogen gas generators has been developed for inflation of rocket deployed balloon structures. The generators utilize a reaction between metal, hydrides and ammonium halides. The chemical reaction is thermally initiated. The generators tested so far are capable of inflating 1-15 cu. ft. structures at STP. The development of solid state hydrogen gas generators for inflation of 1,000-100,000 cu. ft. balloon structures appears feasible.

A74-11315 # The case for hydrogen fueled transport aircraft. G. D. Brewer (Lockheed-California Co., Burbank, Calif.). American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1323. 13 p. 14 refs. Members, \$1.50; nonmembers, \$2.00.

Arguments in favor of the substitution of liquid hydrogen for oil to power commercial aircraft are presented. Shortage of petroleum in the United States and the need for import will lead to unacceptable dependence on foreign nations, will cost the U.S. heavily in terms of deficit balance of payments, and can become a continuous threat of interruption of oil supply that will endanger our independence in the fields of commerce, world trade, diplomacy, and even our national security. In addition, hydrogen offers potential advantages when used in aircraft. Examples of subsonic and supersonic commercial aircraft are examined to determine the advantages in performance, pollution, noise, and cost. Some problems associated with the use of liquid hydrogen as a fuel are discussed.

V.P.

A74-12201 Spacecraft electrical power, E. Stofel (Hughes Aircraft Co., El Segundo, Calif.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record.

New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 225-231. 13 refs.

Present developments in spacecraft power systems are placing strong emphasis on component weight reduction and efficiency improvements as a means of obtaining spacecraft with more power. The most striking of these are: (1) the improved efficiency of solar cells; (2) light-weight, large area solar arrays; (3) the possibility of light-weight nickel-hydrogen energy storage units; and (4) restructuring of power control electronics at higher operating voltages. These developments will tend to encourage further use of solar cell power systems for increasingly larger spacecraft, a trend that is already well established by the use of solar cells on almost all past and present spacecraft. Nuclear powered systems are advancing at a slower rate, with limited funding, and, therefore, apparently will remain relegated to special situations, such as missions to the outer planets or where physical compactness is a distinctive requirement.

A74-12242 * # High voltage solar cell power generating system for regulated solar array development. E. Levy, Jr. (Hughes Aircraft Co., Los Angeles, Calif.) and A. C. Hoffman (NASA, Lewis Research Center, Cleveland, Ohio). American Institute of Aeronautics and Astronautics, Electric Propulsion Conference, 10th, Lake Tahoe, Nev., Oct. 31-Nov. 2, 1973, Paper 73-1105. 13 p. Members, \$1.50; nonmembers, \$2.00. Contract No. NAS3-15826.

A laboratory solar power system regulated by on-panel switches has been delivered for operating high power (3 kw), high voltage (15,000 volt) loads (communication tubes, ion thrusters). The modular system consists of 26 solar arrays, each with an integral light source and cooling system. A typical array contains 2560 series-connected cells. Each light source consists of twenty 500 watt tungsten iodide lamps providing plus or minus 5 per cent uniformity at one solar constant. An array temperature of less than 40 C is achieved using an infrared filter, a water cooled plate, a vacuum hold-down system, and air flushing.

(Author)

A74-12794 # Actual state of French technical developments concerning sources of space power (Etat actual des dévelopments techniques français en matière de sources de puissance spatiales). W. Palz and C. Martin (Centre National d'Etudes Spatiales, Paris, France). International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper. 17 p. 6 refs. In French.

French progress in study and research concerning solar generators for space applications is described. On the level of components continuing effort is being put forth to perfect silicon cells. The development of thin-film cadmium sulfide cells has reached the stage of practicality. In the years to come complete commercial production is expected. Rigid and flexible structures of solar panels have been developed in the 100 W to 10 kW range. Research and development work in this field is reviewed.

A74-12905 * # Industrial use of aerospace technology. J. E. Burnett (NASA, Lewis Research Center, Cleveland, Ohio). International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper, 5 p.

Using a few selected examples of the several hundred successful transfers of aerospace technology to applications outside the aerospace field, it is shown that aerospace-related new technology does have many valuable nonaerospace uses. The examples presented include technology transfers to the machine tool and petroleum industries as well as to the fields of electric utilities and computer-aided structure design.

M.V.E.

A74-13234 * # Satellite nuclear power station: An engineering analysis. J. R. Williams, J. D. Clement (Georgia Institute of Technology, Atlanta, Ga.), R. J. Rosa, K. D. Kirby, and Y. Y. Yang. Research supported by NASA; Grant No. NGR-11-002-145. Atlanta, Ga., J.R. Williams, Georgia Institute of Technology, 1973, 143 p. 41 refs.

A nuclear-MHD power plant system which uses a compact non-breeder reactor to produce power in the multimegawatt range is analyzed. It is shown that, operated in synchronous orbit, the plant would transmit power safely to the ground by a microwave beam. Fuel reprocessing would take place in space, and no radioactive material would be returned to earth. Even the effect of a disastrous accident would have negligible effect on earth. A hydrogen moderated gas core reactor, or a colloid-core, or NERVA type reactor could also be used. The system is shown to approach closely the ideal of economical power without pollution.

V.P.

A74-13293 # Conversion of fuel nitrogen to NOx in a compact combustor. H. R. Hazard (Battelle Columbus Laboratories, Columbus, Ohio). American Society of Mechanical Engineers, Winter Annual Meeting, Detroit, Mich., Nov. 11-15, 1973, Paper 73-WA/GT-2, 4 p. Members, \$1.00; nonmembers, \$3.00.

A low-nitrogen fuel, ASTM Jet A aviation kerosene, was doped with increasing amounts of pyridine as a means of increasing the content of chemically bound nitrogen; it was then burned at a rate of 50 lb/hr in a compact combustor incorporating staged air admission with a rich primary zone and water cooling of the walls. Each increase in fuel nitrogen content resulted in a significant increase in NOx in the combustion products, and it is estimated that as much as 90% of the fuel nitrogen was converted to NOx at very low nitrogen levels, decreasing to 55% conversion at higher levels. These results are consistent with data reported for large steam boilers and for small residential boilers. It appears that emission standards requiring very low levels of NOx emission will require use of fuels with very low nitrogen content. (Author)

A74-13448 Thermoelectric generators (Les générateurs thermoélectriques). R. Stoll (Thomson-CSF, Division Faisceaux Hertziens, Levallois-Perret, Hauts-de-Seine, France). Entropie, vol. 9.

July-Aug. 1973, p. 37-44. In French.

Consideration of the technology and characteristics of various types of thermoelectric flame generators, and review of the design of power plants employing such generators. A detailed description is given of the thermoelectric modules, the combustion chamber, and the heat exchangers employed in a thermoelectric flame generator, and various possible applications of these generators are noted, with particular emphasis placed on their use as power supplies for a radio beam relay station. It is concluded that currently used thermoelectric flame generators are well adapted to user needs, and are reliable and competitive with energy sources such as solar cells or high-capacity chemical batteries.

A.B.K.

A74-13559 Effect of the sun, the moon and solar radiation pressure on a near-equatorial synchronous satellite. C.-H. Zee (Grumman Aerospace Corp., Bethpage, N.Y.). Astronautica Acta, vol. 18, Oct. 1973, p. 281-287. 9 refs. Research sponsored by the Grumman Aerospace Corp.

The effect of the sun, the moon and solar radiation pressure on a near-equatorial synchronous satellite is investigated by an extension of the previous work on the effect of the sun and the moon. In addition to the orbital plane movement mainly due to the sun and the moon, the solar radiation pressure results in the change of eccentricity as well as the rotation of the line of apsides. However, an integrated solution is presented to show the coupled effect of all orbital elements. (Author)

A74-13798 Performance and noise aspects of supersonic transport. J. Calmon and R. Hoch (SNECMA, Paris, France). In: INTER-NOISE 73; Proceedings of the International Conference on Noise Control Engineering, Copenhagen, Denmark, August 22-24, 1973. Lyngby, INTER-NOISE 73, Danmarks Tekniske Hoiskole, 1973. p. 464-473. 5 refs.

The operating economics of a supersonic commercial aircraft are shown to be very sensitive to changes in power plant weight and propulsion efficiency and, therefore, necessarily compelled to be noisier than subsonic aircraft at the same technology level. It is expected that the noise level of supersonic commercial aircraft will be governed by the capability of varying optimal aerodynamic and propulsive configurations between takeoff and cruise.

M.V.E.

A74-13943 Optimization of the power of Faraday MHD generators operating on nonequilibrium plasma. V. S. Vorob'ev and V. I. Krasnov (Akademiia Nauk SSSR, Nauchno-Issledovatel'skii Institut Vysokikh Temperatur, Moscow, USSR). (Teplofizika Vysokikh Temperatur, vol. 11, Jan.-Feb, 1973, p. 161-166.) High Temperature, vol. 11, no. 1, Sept. 1973, p. 134-138. 6 refs. Translation.

The electric output power of a Faraday-type MHD-generator using an inequilibrium turbulent plasma as the working medium is optimized under the assumption that the damping parameters of the gas at the channel inlet, the magnetic flux density, and the length and maximum cross section of the channel are known. Expressions relating the optimal local parameters are derived, and a system of equations describing the optimal flow is solved numerically. Calculations for a helium-cesium mixture are performed as an example. V.P.

A74-13944 Qualitative analysis of the efficiency of MHD energy conversion. V. Iu. Baranov, D. D. Maliuta, V. P. Panchenko, and F. R. Ulinich (Akademiia Nauk SSSR, Institut Atomnoi Energii, Moscow, USSR). (Teplofizika Vysokikh Temperatur, vol. 11, Jan.-Feb. 1973, p. 167-173.) High Temperature, vol. 11, no. 1, Sept. 1973, p. 139-144. Translation.

A method is proposed for solving the system of one-dimensional differential equations describing the gas flow in the channel of a Faraday-type MHD generator with ideally segmented electrodes. The convergence efficiency of the generator is determined as a function

of the generator length and the load factor. The influence of the channel shape and the inlet Mach number on the conversion factor is examined, and the range of optimal parameters is determined. The energy conversion efficiency of a Faraday-type generator with solid electrodes is discussed.

V.P.

A74-14043 Cryogenic Engineering Conference, University of Colorado, Boulder, Colo., August 9-11, 1972, Proceedings. Conference sponsored by the National Academy of Sciences, National Bureau of Standards, et al. Edited by K. D. Timmerhaus (Colorado, University, Boulder, Colo.; National Science Foundation, Engineering Div., Washington, D.C.). New York, Plenum Press (Advances in Cryogenic Engineering, Volume 18), 1973, 544 p. \$30.

Recent developments in various aspects of low-temperature technology are reviewed in papers dealing with cryogenic processes, equipment, instrumentation, properties, and applications. General areas covered include liquefied natural gas technology, heat transfer measurements, insulation systems, cryogenic fluid mechanics, mechanical properties of structural materials used in cryogenic systems, determination of the thermodynamic properties of cryogenic fluids, thermal properties of nylons and greases, cryogenic instrumentation systems, refrigeration equipment, practical applications of superconductivity, and the preparation of atomic and metallic hydrogen.

A74-14046 # Development program for a liquid methane heat pipe. W. G. Foster and D. O. Murray (Lockheed Research Laboratories, Palo Alto, Calif.). In: Cryogenic Engineering Conference, Boulder, Colo., August 9-11, 1972, Proceedings.

New York, Plenum Press, 1973, p. 96-102. 8 refs.

Description of a development program on the design of a heat pipe which would transfer 2 W of power over a length of 122 cm, with a total temperature drop of 2 K and a condenser temperature of 110 K. The heat pipe is intended for spacecraft applications, and the design requirements were satisfied by a simple wire-cloth wick, using methane as the working fluid. Thermal tests in a one-g field were conducted, and results agreed closely with the predicted performance. The radial temperature gradient was found to be smaller than anticipated for a methane heat pipe. No degradation in performance was found after the prototype was subjected to launch environment.

A74-14057 # Cryogenic instrumentation at and above liquid hydrogen temperature - Present and future. W. E. Keller (California, University, Los Alamos, N. Mex.). In: Cryogenic Engineering Conference, Boulder, Colo., August 9-11, 1972, Proceedings.

New York, Plenum Press, 1973, p. 289-300. 18 refs. AEC-sponsored research.

Discussion of instrumentation problems associated with present and possible future large-scale cryogenic systems operating at or above liquid hydrogen temperatures - i.e., at temperatures above 13.8 K. Emphasis is placed on energy applications involving the use of liquid oxygen, liquid hydrogen, and liquefied natural gas as fuels and refrigerants. The types of processes and information which may be required in order to operate and regulate such large-scale cryogenic systems are outlined together with presently available and anticipated types of instrumentation required to meet operational demands. Attention is given to liquefaction and refrigeration systems, dewar insulation, liquid level sensors, measurement of state properties, and special storage methods.

A74-14112 The use of the Space Shuttle to support large space power generation systems. P. E. Glaser (Arthur D. Little, Inc., Cambridge, Mass.). In: Space Shuttle payloads; Proceedings of the Symposium, Washington, D.C., December 27, 28, 1972.

Tarzana, Calif., American Astronautical Society, 1973, p. 167-191. 18 refs.

The feasibility of obtaining power from space by means of a sateflite solar power station is reviewed. The requirements for a high-volume transportation system to low earth orbit followed by delivery of partially assembled components to geosynchronous orbit for final assembly and deployment are discussed. The steps required to develop the satellite solar power station are outlined with emphasis on supporting technology development and verification of technology readiness. The role of the Space Shuttle in spaceborne flight verification activities is projected and requirements for Space Shuttle payloads are indicated. (Author)

A74-14121 Use of Shuttle in establishing large space installations. K. A. Ehricke (North American Rockwell Corp., Space Div., Downey, Calif.). In: Space Shuttle payloads; Proceedings of the Symposium, Washington, D.C., December 27, 28, 1972.

Tarzana, Calif., American Astronautical Society, 1973, p. 397-447. 23 refs.

Consideration of the feasibility of setting up an orbiting solar reflector and orbiting space power generation and distribution plants. A system called Lunetta, designed for practically useful night illumination of areas of the earth's surface by a reflector in equatorial geosynchronous orbit, is described. The socio-economic value of the Lunetta is stressed by citing the possibility of conducting agricultural activities with its aid at night. Problems connected with the choice of the size, location, and brightness of Lunetta are discussed, as well as problems of weight minimization and radiation-pressure compensation. The possibility of large-scale power generation in space, using nuclear, solar-thermal, and photovoltaic-reflector systems, is considered, as well as a power relay concept involving large antennas in geosynchronous orbit, reflecting and redirecting the energy flow of microwave beams. The ability of the Integrated Space Shuttle configuration selected by NASA and the Geospace Interorbital Transportation vehicle (incorporated in the Shuttle payload and then released in low orbit) to assist in the construction of large installations in geosynchronous orbit is evaluated.

A74-14133 Power conditioning system for FAA Air Route Traffic Control Centers. A. J. Froehlich, Jr. (FAA, Washington, D.C.) and A. Kusko (Alexander Kusko, Inc., Needham Heights, Mass.). In: Western Electronic Show and Convention, San Francisco, Calif., September 11-14, 1973, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1973, p. 25/2-1 to 25/2-4.

The FAA is currently installing solid-state uninterruptible power source (UPS) equipment to supply electrical power at a high level of reliability in 20 U.S. air route traffic control centers. Each UPS consists of several parallel-connected 200-kVA rectifier-inverter modules which operate either from the commercial power line or from batteries and engine-generator sets upon failure of the commercial power. Performance and reliability requirements dictated by application in the air route traffic control centers are outlined together with plans developed for testing and maintenance of these power units.

A74-14248 Chemical storage of hydrogen in Ni/H2 cells. M. W. Earl and J. D. Dunlop (COMSAT Laboratories, Clarksburg, Md.). COMSAT Technical Review, vol. 3, Fall 1973, p. 437-441. 5 refs. Research sponsored by the International Telecommunications Satellite Organization.

It is shown that LaNi5 hydride can be used to reduce the operating pressure of a nickel/hydrogen cell without affecting its high cycle-life expectancy. Advantages of this concept are: safe operation at high hydrogen pressures, cell volume reduction of almost 50%, and simplification of cell pressure vessel design through prismatic-type cell construction; this eliminates electrolyte loss problems, provides an electrode stack design with improved shock and vibration characteristics, and simplifies battery packaging. V.P.

A74-14250 Vitreous oxide antireflection films in highefficiency solar cells. A. G. Revesz (Communications Satellite Corp., Washington, D.C.). *COMSAT Technical Review*, vol. 3, Fall 1973, p. 449-452, 7 refs.

Lindmayer and Allison (1973) have shown that the short wavelength response and the fill factor of silicon solar cells can be significantly improved by using a major modification of the grid geometry in combination with a very shallow junction and a new antireflection film. The new cell, termed the violet cell, has a conversion efficiency of 13 to 14 percent. The theoretical considerations on which the antireflection film is based are outlined, and test data are examined.

A74-14327 Thermionic energy conversion. Volume 1 - Processes and devices. G. N. Hatsopoulos (Thermo Electron Corp.; MIT, Cambridge, Mass.) and E. P. Gyftopoulos (MIT, Cambridge, Mass.), Research sponsored by the U.S. Atomic Energy Commission. Cambridge, Mass., MIT Press, 1973, 276 p. 98 refs. \$17.95.

A qualitative description of thermionic converters is given and basic phenomena in thermionic conversion are considered together with types of thermionic converters, the characteristics of typical thermionic converters, thermionic-converter systems, and aspects of thermionic conversion with other electrical power systems. Questions regarding the ideal performance of diode thermionic converters are examined, giving attention to thermionic emission, a simple diode thermionic converter, electron-motive diagrams through the interelectrode space, output-current characteristics, energy-conversion efficiency, and optimum ideal performance. Vacuum thermionic converters are described along with vapor thermionic converters.

G.R.

A74-14463 The second fifteen years in space; Proceedings of the Eleventh Goddard Memorial Symposium, Washington, D.C., March 8, 9, 1973. Symposium sponsored by the American Astronautical Society. Edited by S. Ferdman (Grumman Aerospace Corp., Bethpage, N.Y.). Tarzana, Calif., American Astronautical Society (Science and Technology Series. Volume 31), 1973. 196 p. \$15.

The forthcoming fifteen years of U.S. efforts in space are examined in papers dealing with the impact of the space program on industrial, scientific, and social aspects of life in the U.S. Attention is given to anticipated developments in rocket engines, the possibility of harnessing solar energy as a source of electric power on earth by means of satellites, the use of computer control systems in manned and automated space vehicles, and the growth of the data communications technology. Exploration of the terrestrial planets is considered in a description of the Viking mission to Mars, and aspects of international cooperation in space are examined together with European space projects after 1980.

T.M.

A74-14465 Solar power for our nation. T. J. Kelly and J. Mockovciak, Jr. (Grumman Aerospace Corp., Bethpage, N.Y.). In: The second fifteen years in space; Proceedings of the Eleventh Goddard Memorial Symposium, Washington, D.C., March 8, 9, 1973. Tarzana, Calif., American Astronautical Society, 1973. p. 39-54. 6 refs.

With increasing attention focusing on the energy problem, considerable interest has recently surfaced relative to the potential use of solar energy as a power source for our nation. This paper assesses the possibilities for near-term and longer-range applications of solar energy, including a large space-based Satellite Solar Power Station. Many applications are well beyond the research phase and could be accelerated to commercial readiness. Longer-range applications should be pursued with appropriate technology development programs to provide this nation with energy options in the future. If the nation wants to use solar energy as a major power source, it is technically possible to do so. Further, with appropriate incentives and government support, the public can have this clean and abundant energy source economically. (Author)

A74-14892 * Quantification of the luminescence intensity of natural materials. R. D. Watson, T. D. Hessin (U.S. Geological Survey, Denver, Colo.), and W. R. Hemphill (U.S. Geological Survey, Washington, D.C.). In: Management and utilization of remote sensing data; Proceedings of the Symposium, Sioux Falls, S. Dak., October 29-November 1, 1973. Falls Church, Va., American Society of Photogrammetry, 1973, p. 364-376, 7 refs. NASA-supported research, NASA Order 1-58514.

Review of some of the results of an evaluation of the use of an airborne Fraunhofer line discriminator (FLD) for the detection of sun-stimulated luminescence emitted by rhodamine WT dye and some other materials. Rhodamine dye is reported to have been detected by airborne FDL in sea water in concentrations of less than 2 ppb. Experiments with a fluorescence spectrometer in the laboratory indicate that luminescence of some samples of crude and refined petroleum exceeds the luminescence intensity of rhodamine dye in concentrations of 10 ppm.

M.V.E.

A74-16116 Regional and global energy transfer via passive power relay satellites. K. A. Ehricke (Rockwell International Corp., Space Div., Downey, Calif.). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973. Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 5-15 to 5-94, 23 refs.

The Power Relay Satellite (PRS) offers interesting possibilities as a feasible, shuttle-compatible method of transferring energy over continental or global distances. The basic principle of the PRS is that a microwave reflector is placed into geosynchronous orbit to redirect energy beamed from a power generation system (power source) to a receiver at a great distance from the power source. There the microwave energy is converted back to electricity for local distribution. Particulars of the transmitter antenna are given. The technology of converting electricity to microwave power was advanced greatly with the development of crossed-field devices. They operate on the principle of electron motion in a crossed electric and magnetic field. Microwave beam transmission is examined. Energy sources and primary electric power plants (PEPPs) in the United States are discussed. Attention is given to the shuttle compatibility of space relaying and its comparison with space power generation.

A74-16123 * Summary of the study of disposal of nuclear waste into space. F. E. Rom (NASA, Lewis Research Center, Power Applications and Systems Analysis Branch, Cleveland, Ohio). In: Technology today and tomorrow; Proceedings of the Tenth Space Congress, Cocoa Beach, Fla., April 11-13, 1973. Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973,

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1973, p. 7-19 to 7-26. 7 refs.

NASA, at the request of the AEC, is conducting a preliminary study to determine the feasibility of disposing of nuclear waste material into space. The study has indicated that the Space Shuttle together with expendable and nonexpendable orbital stages such as the Space Tug or Centaur can safety dispose of waste material by ejecting it from the solar system. The safety problems associated with all phases of launching and operation (normal, emergency and accident) of such a system are being examined. From the preliminary study it appears that solutions can be found that should make the risks acceptable when compared to the benefits to be obtained from the disposal of the nuclear waste. (Author)

A74-16909 Evolution of studies in the field of gas lasers (Evolution des recherches dans le domaine des lasers à gaz). J. Robieux (Compagnie Générale d'Electricité, Marcoussis, Essonne, France). (Société Française de Physique, Congrès, Vittel, France, May 28-June 2, 1973.) Journal de Physique, vol. 34, Nov.-Dec. 1973, Supplement, p. C2-81 to C2-103. In French. Research supported by the Direction des Recherches et Moyens d'Essais, and Commissariat à l'Energie Atomique.

The progress of research in the field of gas lasers in the last five years is assessed, and a tentative prediction of what the evolution might be in the years to come is offered. The main objectives of work in this area are, first, obtaining the high laser energies in short time durations needed for the feasibility studies of laser induced nuclear fusion and second, investigating the physical principles that can be used to make laser sources capable of delivering high average powers. The physical phenomena that control the operation of presently existing laser devices are now sufficiently understood so that it is possible to predict that a new generation of lasers could be designed in the future, operating in the UV or possibly the X ray region of the spectrum.

A74-17195 # Recent developments in the field of thermionic power conversion and its possible effects on power supply systems in space and on earth (Neuere Entwicklungen auf dem Gebiet der thermionischen Energiewandlung und deren mögliche Auswirkungen auf Energieversorgungssysteme im Weltraum und auf der Erde). R. Henne (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Energiewandlung und elektrische Antriebe, Stuttgart, West Germany). Österreichische Gesellschaft für Weltraumforschung und Flugkörpertechnik and Deutsche Gesellschaft für Luft- und Raumfahrt, Gemeinsame Jahrestagung, 6th, Innsbruck, Austria, Sept. 24-28, 1973, DGLR Paper 73-092. 13 p. In German

A74-17204 # Technological problems with large-area solar cell arrays (Technologische Probleme bei grossflächigen Solargeneratoren). N. Römisch (Gesellschaft für Weltraumforschung mbH, Porz-Wahn, West Germany). Österreichische Gesellschaft für Weltraumforschung und Flugkörpertechnik and Deutsche Gesellschaft für Luft- und Raumfahrt, Gemeinsame Jahrestagung, 6th, Innsbruck, Austria, Sept. 24-28, 1973, DGLR Paper 73-107. 26 p. 11 refs. In German.

Comparative study of two proposed solar cell array concepts with respect to their design, testing, launching, and operation. The two concepts considered are, respectively, a collapsible semirigid array and a flexible rollout array. A detailed study is made of launch vehicle constraints on weight and storage volume in the two concepts, the effects of reaction forces resulting from extension of the solar array on orbital and attitude control of the satellite are assessed, and an analysis is made of the heat-transfer and power-generating capabilities of the two concepts.

A.B.K.

A74-17296 # Photosensitive elements for solar sensors (Eléments photo-sensibles pour senseurs solaires). Y. Salles (Radiotechnique-Compelec, Caen, France). Industries Atomiques et Spatiales, vol. 17, Sept. Oct. 1973, p. 41-46. In French.

Spacecraft stability and attitude control is usually obtained through solar sensors with silicon transistors. Three types of solar cells are described: by focusing, by angle of attack, and digital, the latter being explained in detail. The selection of the silicon chip, the technology and the assembly of the transistors, and applications to the satellite Symphonic are discussed.

N.D.

A74-17439 Characteristics of a nonequilibrium MHD generator. A. E. Buznikov, V. E. Vanin, and V. V. Kirillov (Akademiia Nauk SSSR, Nauchno-Issledovatel'skii Institut Vysokikh Temperatur, Moscow, USSR). (Teplofizika Vysokikh Temperatur, vol. 11, May-June 1973, p. 622-631.) High Temperature, vol. 11, no. 3, Jan. 1974, p. 554-561. 23 refs. Translation.

Results of experimental studies of a nonequilibrium MHD generator operating with a potassium-seeded argon plasma. Test measurements were performed at Hall numbers ranging from 1.5 to 25, electron temperatures of 1800 to 2800 K, electron-to-neutral particle temperature ratios of 1.1 to 1.8, and various values of relative wall temperature. It is shown that in addition to the influence of ionizational instability, the characteristics of a non-

equilibrium MHD generator are substantially affected by imperfections of electrical insulation in the channel and by inhomogeneities of nonequilibrium-plasma conductivity in layers near the electrodes.

A74-17654 Present state of the art in conductive coating technology. H. Köstlin (Deutsche Philips GmbH, Forschungslaboratorium, Aachen, West Germany) and A. Atzei (ESRO, Energy Conversion Div., Noordwijk, Netherlands). In: Photon and particle interactions with surfaces in space; Proceedings of the Sixth ESLAB Symposium, Noordwijk, Netherlands, September 26-29, 1972.

Dordrecht, D. Reidel Publishing Co., 1973, p. 333-340: Discussion p. 340, 341.

The existence of an electrically conductive coating ensures potential uniformity on the surface of a solar array. The development and preparation of this coating are described. The conductive layer consists of a very thin Sn doped In2O3 film which reduces the solar flux received at the cell's surface by only 1-2%; it does not affect the equilibrium temperature of the cells. Results of space qualification tests indicate that their properties remain unchanged under space environment condition.

(Author)

A74-17813 * # Assessment of lightweight mobile nuclear power systems. J. Ł. Anderson and F. E. Rom (NASA, Lewis Research Center, Cleveland, Ohio). American Nuclear Society, Winter Meeting, San Francisco, Calif., Nov. 11-15, 1973, Paper. 34 p. 45 refs.

After nearly two decades of study, analysis, and experiments relating to lightweight mobile nuclear power systems (LMNPS), it seems fitting to report the status and to assess some options for the future of this technology. This report: (1) reviews the technical feasibility studies of LMNPS and airborne vehicles; (2) identifies what remains to be done to demonstrate technical feasibility of LMNPS; (3) reviews missions studies and identifies particular missions that could justify renewed support for such technology; and (4) identifies some of the nontechnical conditions that will be required for the development and eventual use of LMNPS. (Author)

A74-17905 # The hydrogen fuel economy and aircraft propulsion. A. L. Austin (California, University, Livermore, Calif.) and R. F. Sawyer (California, University, Berkeley, Calif.). American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1319. 6 p. 20 refs. Members, \$1.50; nonmembers, \$2.00. Grant No. AF-AFOSR-72-2299.

Considerable interest has been directed toward the use of hydrogen as an ultimate replacement for fossil fuels. It is clean burning at comparable thermal efficiencies in piston and turbine engines, exists as a huge resource, and since the primary combustion product is water, the cycle from ecosphere to use and back to ecosphere is probably measured in years rather than millions of years as is the case with fossil fuels via the carbon cycle. The other fundamental advantage is that energy storage per unit weight is less than fossil fuels, and therefore hydrogen is an attractive fuel for aircraft. Large new sources of hydrogen at a low price are required before hydrogen can play an important role as an aircraft fuel, F.R.L.

A74-18180 Aviation fuels and lubricants (Flugkraftstoffe und Flugschmierstoffe). G. Spengler (München, Technische Universität; Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugtreib- und Schmierstoffe; Landesgewerbeanstalt, Bayern, Prüfamt für Brenn-, Kraft- und Schmierstoffe, Munich, West Germany), E. Jantzen, and J. Kern (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugtreib- und Schmierstoffe, Munich, West Germany). VDI-Z, vol. 115, no. 18, Dec. 1973, p. 1457-1459, 52 refs, In German.

It is pointed out that in the case of the fuel required for supersonic aircraft the lubricating properties of the fuel itself are insufficient. The needed lubricating characteristics of the fuel have, therefore, to be provided by suitable additives. Approaches for reducing the air pollution produced by aircraft are discussed together with developments regarding fuels for missiles operating at conventional and hypersonic velocities. The use of dry lubricating agents, such as molybdenum disulfide, is considered in connection with a discussion of aviation lubricants.

A74-18189 Energy supply and energy transformers in satellites and spacecraft (Energieversorgung und Energiewandler in Satelliten und Raumfahrzeugen). W. Peschka (Deutsche Forschungsund Versuchsanstalt für Luft- und Raumfahrt, Institut für Energiewandlung und elektrische Antriebe, Stuttgart, West Germany). VDI-Z, vol. 115, no. 18, Dec. 1973, p. 1494, 1495. 18 refs. In German.

The energy sources considered include batteries, fuel cells, radioisotopes, and small reactors. Advances with regard to operational life are reported for sodium-sulfur and lithium batteries. Sodium batteries with water as electrolyte have also been developed. The status of solar cells is discussed together with mechanical electrical transducers, thermoelectric transducers, and thermionic transducers.

A74-18797 * # The jet engine design that can drastically reduce oxides of nitrogen. A. Ferri and A. Agnone (New York University, Bronx, N.Y.). American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 12th, Washington, D.C., Jan. 30-Feb. 1, 1974, Paper 74-160, 10 p. Members, \$1.50; nonmembers, \$2.00, Grant No. NGR-33-016-131.

The problem is analyzed for the case of hydrogen fuel, taking into account supersonic and hypersonic vehicles using scramjet engines. The combustion in scramjets occurs at very high velocity and in a short time. In scramjet combustor designs, two different criteria can be used to design the engine. The amount of NO formed in the diffusion flame depends substantially on the maximum temperature reached. Effects of changing the mode of combustion from a diffusion flame to a heat conduction flame are considered, giving attention to the amount of NO produced in an engine of a given design.

A74-18798 # The refining of turbine fuels by modern hydrotreating, R. L. Richardson and B. Peralta (Union Oil Company of California, Brea, Calif.). American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 12th, Washington, D.C., Jan. 30-Feb. 1, 1974, Paper 74-162. 5 p. Members, \$1.50; non-members, \$2.00.

This paper reviews the present status of technology for removing sulfur compounds and hydrogenating aromatics in jet fuels, often designated as turbine fuels. The newer technique of catalytic hydrotreating will be emphasized because of its effectiveness in removing sulfur as well as nitrogen compounds, its flexibility in refinery applications, and its ability to upgrade other fuel characteristics, such as smoke point, aromatics content and thermal stability.

(Author)

A74-18925 Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues (Überschallkraftstoffe aus Mittelölen der thermischen Krackung von Rohölrückständen). R. Erlmeier (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugtreib- und Schmierstoffe, Munich, West Germany) and E. Meisenburg (Union Rheinische Braunkohlen Kraftstoff AG, Wesseling, West Germany). Erdöl und Kohle Erdgas Petrochemie vereinigt mit Brennstoff-Chemie, vol. 26, June 1973, p. 334-338. 10 refs. In German. (DFVLR-SONDDR-301)

The processing steps involved in obtaining the fuels are discussed, taking into account distillation, hydrogenation, and refining procedures. Attention is given to the effect of n-paraffins

and aromatic compounds on the fuel characteristics. The composition of the fuels was determined by analytical procedures which included thermodiffusion and NMR measurements. The properties of the fuels are compared with the requirements for fuels on a hydrocarbon basis which are to be used for velocities at Mach number 3. The investigation shows that the considered approach can provide suitable fuels for supersonic flight applications.

G.R.

A74-18988 On the theory of alternating-current electrofluiddynamic converters. V. A. Kas'ianov and A. A. Mkhitarian (Kievskii Institut Inzhenerov Grazhdanskoi Aviatsii, Kiev, Ukrainian SSR). (Gidromekhanika, vol. 21, 1972, p. 65-69.) Fluid Mechanics -Soviet Research, vol. 2, Nov.-Dec. 1973, p. 157-162. Translation.

Linearized systems are considered. The solutions which are obtained are of interest from the point of view of qualitative analysis of the electrofluiddynamic (EFD) method of boundary layer control, when variable control voltage is used. The medium is assumed to be an incompressible colloid. The conversion section is a broad channel in which one-dimensional unsteady flow is produced between permeable flat electrodes. The solutions obtained are the first approximation for more complex problems in the field of EFD acconverters.

A74-19724 Gas-heated 'heat pipe' vacuum furnace (Gasbe-heizter 'Wärmeröhren' Vakuumofen). M. Stadelmann (Fotos Hutchins Photography, Inc., Beimont, Mass.). Schweizerische Technische Zeitschrift, vol. 71, Jan. 17, 1974, p. 40-43. 5 refs. In German.

The heat pipe is a very efficient device for the transportation of heat at high temperatures on a thermoionic basis. One of the applications of the heat pipe is connected with the development of a vacuum furnace which utilizes natural gas for heating. In the new device the heat pipe is used for the transfer of heat from a high-temperature burner to a vacuum chamber. The vacuum furnace provides temperatures up to 1037.5 C at a vacuum of 5 microtorr.

STAR ENTRIES

N74-10043*# National Aeronautics and Space Administration. Lawis Research Center, Cleveland, Ohio. REFAN PROGRAM. PHASE 1: SUMMARY REPORT Eldon W. Sams and Donald L. Bresnahan Oct. 1973 70 p (NASA-TM-X-71456: E-7749)

The Refan Program is aimed at a large reduction in aircraft approach and takeoff noise in the vicinity of airports caused by the JT3D-powered 707's and DC-8's and the JT8D-powered 727's, 737's and DC-9's. These aircraft represent a major part of the existing commercial fleet. The noise reductions can be achieved by engine and nacelle modifications in the form of aircraft retrofit kits. Engine turbomachinery noise is reduced by replacing the current two-stage fan with a larger single-stage fan and by nacelle acoustic treatment. Jet noise is reduced by the reduction on jet velocity caused by additional turbine work extraction to drive the larger bypass fan. The predicted net effect of these modifications on installed performance is large noise reductions on both approach and takeoff, increased takeoff thrust. decreased takeoff field length, and maintained or improved aircraft range depending on the amount of acoustic treatment included. The Refan Program is being conducted in two phases under contracts with one engine and two airframe companies. Results of the Phase I work are summarized in this report which describes the refan nacelle configurations studied, the airplane modifications required to install the nacelles, and the resulting airplane performance and noise reductions predicted for all five aircraft.

N74-10074 Michigan Univ., Ann Arbor. EXPERIMENTAL DETERMINATION OF DYNAMIC CHARAC-TERISTICS OF HYDROGEN OXYGEN FUEL CELL SYSTEMS Ph.D. Thesis Bernard Ren Hao 1972 129 p

Dynamic characteristics of aqueous electrolyte hydrogenoxygen fuel cells were investigated at various cell temperatures, electrolyte concentrations, electrode spacings, and types of electrodes. An electrical circuit was employed as a mathematical model in correlating the dynamic response of the test cell to the related system parameters. A RC electrical circuit which included an ideal voltage source was proposed as the mathematical model for the fuel cell systems, and the circuit components were determined experimentally. The ideal voltage source in the equivalent network was determined by the open circuit voltage of the test fuel cell. The internal resistance of the test cell was determined by a galvanostatic method. The measured fuel cell internal resistance was found to be independent of the fuel cell Dissert. Abstr. load current and frequency.

N74-10075*# Florida Univ., Gainesville. Engineering and Industrial Experiment Station. MASS TRANSFER IN FUEL CELLS Semiannual Report, 1 Sep. 1972 - 28 Feb. 1973 Robert D. Walker, Jr. 26 Sep. 1973 50 p refs (Grant NGR-10-005-022)

(NASA-CR-134519: SAR-15)

Results of experiments on electron microscopy of fuel cell components, thermal decomposition of Teflon by thermogravimetry, surface area and pore size distribution measurements water transport in fuel cells, and surface tension of KOH solutions are described. Author

N74-10078*# Gould, Inc., Mendota Heights, Minn. FABRICATION AND TESTING OF NEGATIVE-LIMITED SEALED NICKEL-CADMIUM CELLS Quarterly Report. 1 Jul. - 30 Sep. 1973 E. Luksha and K. C. Kohl 10 Oct. 1973 15 p refs Prepared

(Contracts NAS7-100; JPL-953680) (NASA-CR-135981: Rept-732-015-1)

The design, construction, and testing of 100,20Ah and 100.3Ah negative-limited sealed cells are reported. The required physical dimensions of the hardware and components necessary to produce 20 and 3 Ah cells were established. The stainless steel cans and covers have been ordered. The covers contain two ceramic seals. The fabrication of electrodes was started. About 55% (879 electrodes) of the required cadmium electrodes has been prepared. About 44% of the porous nickel substrates (plaques) required for the preparation of the nickel oxide electrodes has been completed.

N74-10080# Army Foreign Science and Technology Center, Charlottesville, Va.

STATE OF DEVELOPMENTS AND RESEARCH PROBLEM ON THE SWITCHING OF SILICON GERMANIUM ALLOY THERMOELECTRIC ELEMENTS

L. L. Silin 30 Jul. 1973 15 p refs Transl, into ENGLISH from Fiz. Khim. Obrab. Mater. (Moscow), no. 2, 1971 р 116-125

(AD-765845; FSTC-HT-23-2026-72) Avail: NTIS CSCL 10/2 The article reviews the development of thermoelectric generators made with silicon germanium alloy thermoelements. GRA

N74-10082# Rocketdyne, Canoga Park, Calif. INVESTIGATION OF CHEMICAL APU APPLICATION FOR SMALL GROUND POWER SOURCES

James N. Ellis and Hartley E. Barber Jun. 1973 95 p refs (Contract DAAK02-72-C-0424)

(AD-765724; R-9284) Avail: NTIS CSCL 10/2

The Chemical APU (CAPU) turboalternator assembly was tested to determine its suitability for application to advanced Army Ground Power Systems. A major test objective was that of determining the allowable continuous power rating for the alternator as a function of rotative speed. Test speeds up to 120,000 rpm in 30,000 rpm increments were evaluated. A nitrogen test rig was used as a drive which invalidated turbine data. The tests show the alternator to be suitable for use in an advanced ground unit operating on a Brayton cycle to produce 3.5 kw at 140,000 rpm. The turbine should be redesigned for gas turbine flow conditions. A Rankine cycle system could use the turboalternator in its present design at a reduced speed (80,000 rpm) to produce 3.2 kw continuous power.

Author (GRA)

N74-10083# Pratt and Whitney Aircraft, South Windsor, Conn. Engineering Facility.

STUDY OF FUEL CELL SYSTEM FOR POWERED BALLOON Final Report, 5 Feb. - 4 Jun. 1973

Lawrence M. Handley Sep. 1973 54 p (Contract F19628-73-C-0139; AF Proj. 6665)

(AD-766253; PWA-4792; AFCRL-TR-73-0447) Avail: NTIS CSCL 10/2

A four-month study was conducted to determine the most economical use of these powerplants for a powered balloon system designated POBAL-S. The fuel cell powerplant selected for this application is an existing model, the PC17A-3, tailored to deliver 2.5 kilowatts at 30 volts d.c. continuously for seven days. In addition to the powerplant itself, the system would contain cryogenic tanks for the 39 pounds of hydrogen and 306 pounds of oxygen used by the fuel cell, a fabric bag for storing the 42 gallons of product water (to maintain constant buoyancy), and a 48-inch-wide-by-88-inch-long aluminum radiator to reject waste heat at 4000 Btu per hour. When loaded with reactants, the power system weighs 707 pounds, equivalent to an energy density of 600 watt-hours per pound. The power system would be mounted on a platform with the payload and the balloon housekeeping equipment to facilitate recovery by parachute. The platform protects everything except the radiator against landing shock, enabling the equipment to be reused for as many as 25 missions. Ground equipment for servicing the reactant tanks is available commercially. (Modified author abstract)

N74-10084# Army Foreign Science and Technology Center, Charlottesville, Va.

POSSIBILITY OF COMMUTATING THERMOELECTRIC BATTERIES WITH THE AID OF MERCURY AMALGAM

Yu. N. Malevskii 9 Dec. 1972 7 p refs Transl. into ENGLISH from Geliotekhnika, Akad. Nauk Uz. SSR (Jashkent), no. 2, 1971 p 22-25

(AD-756068: FSTC-HT-23-1275-72) Avail: NTIS - CSCL 10/2

One of the serious difficulties in the technology of preparation of thermoelectric energy converters is the commutation of thermoelement's branches which would secure a sufficient mechanical strength and low ohmic resistance contacts between current conducting bars and semiconductor materials of the thermoelement. Elimination of the commutation contact resistances is one of the most important problems in the design of thermoelements.

Author (GRA)

N74-10085# Energy Research Corp., Bethel. Conn.
ELECTROLYTE FOR HYDROCARBON AIR FUEL CELLS
Semiannual Technical Report. 7 Nov. 1972 - 7 Apr. 1973

Semiannual Technical Report, 7 Nov. 1972 - 7 Apr. 1973
Ralph N. Camp and Bernard S. Baker Jul. 1973 34 p refs
(Contract DAAK02-73-C-0084; DA Proj. 170-61102-A-34A)
(AD-766313; ERC-00845) Avail: NTIS CSCL 10/2

Several acids were tested for use with direct hydrocarbon fuel cell electrolytes. Complete fuel cells of the matrix and free electrolyte type were used as test vehicles. The performance of cells possessing H3PO4 electrolyte served as a baseline. Only one, tetrafluoroethanedisulfonic acid synthesized at Energy Research Corporation was shown to be superior to phosphoric acid for direct propage oxidation of elevated temperature.

Author (GRA)

N74-10086# Energy Research Corp., Bethel, Conn. MATRICES FOR H3PO4 FUEL CELLS Final Report

Ralph N. Camp and Bernard S. Baker Aug. 1973 49 p refs (Contract DAAK02-72-C-0247; DA Proj. 176-62705-A-012) (AD-766312; ERC-0959F) Avail: NTIS CSCL 10/2

Matrices to contain 150C phosphoric acid were perfected. These matrices contain an organic fibre, Kynol, and a thermosetting binder of similar chemical structure, Resinox. In addition Ta205 is added to improve the wetting characteristics. The matrices can be produced in uniform, large sheets. Anodes for the oxidation of hydrogen contaminated with carbon monoxide in H3P04 were also explored. Using supported catalyst techniques, C0 tolerant anodes contain .8 mg/sq cm of a mixture of platinum and ruthenium performed at better than .6V at 100mA/sq cm current density for a period in excess of 500 hours.

N74-10128# Army Foreign Science and Technology Center, Charlottesville, Va.

COMMERICAL PETROLEUM PRODUCTS, PROPERTIES AND APPLICATIONS

N. G. Puchkov 21 Dec. 1972 685 p Transl. into ENGLISH of the publ. "Tovarnye Nefteprodukty, Ith Sovistva i Primenenie" Moscow, Khim., 1971

(AD-754703: FSTC-HT-23-1838-72) Avail: NTIS CSCL 07/1

Replacing an earlier reference work, Tekhnicheskiye Normy na Nefteprodukty (Technical Standards for Petroleum Products), the handbook updates this field by inclusion of additional products and discussion of properties and applications. Covered are fuels, oils, lubricants, and other commercial petroleum products produced by Soviet oil refining enterprises. Standards, technical conditions, component composition, main operating qualities, and uses of these products are discussed.

Author (GRA)

N74-10129# Bureau of Mines, Washington, D.C. THE ASSOCIATION OF AUTOMOTIVE FUEL COMPOSITION WITH EXHAUST REACTIVITY

Basil Dimitriades, B. H. Eccleston, G. P. Sturm, Jr., and C. J. Raible Jul. 1973 57 p refs Prepared for Environ. Protection Agency Research Triangle Park, N. C.

(PB-222609/0; BM-RI-7756) Avail: NTIS HC \$3.50 CSCL

The association of automotive fuel composition with exhaust reactivity was studied in an experimental program that involved testing with different automotive engines and with assolines of varied composition. Results showed clearly the exhaust reactivity to increase with increasing levels of polyalkylbenzenes in the fuel. For the purposes of the study, had it been possible, fuel composition should have been defined and expressed in terms of component groups such that the potential for exhaust reactivity would be the same within each group and different from group to group. Statistical analysis of the mass emissions data showed significant car and fuel effects on hydrocarbon, carbon monoxide, nitric oxide, total aldehydes, and formaldehyde emission levels and on total photochemical reactivity. Correlations were found between mass emission parameters and fuel composition. (Modified author abstract) GRA

N74-10199# National Research Council of Canada, Ottawa (Ontario).

INVESTIGATION OF SILICON PHOTOELECTRIC CELLS AS PRECISION PHOTODETECTORS

N. Muroi and M. Ishino. 1973. 24 p. refs. Transl, into ENGLISH from Shomei Gakkai Zasshi (Japan), v. 52, no. 4, 1968 p. 20-26.

(NRC-TT-1686) Avail: NTIS HC \$3.25

The use of silicon photoelectric cells as photodetectors is evaluated. It is found that silicon photoelectric cells offer good, stable photodetectors, but in view of the energy gap there are still more effective photorecaptors than silicon photoelectric cells. For example, there are monocrystal photoelectric cells and multilayer photoelectric cells of the monocrystals GaAs, InP, CdTe and CdSe.

N74-10240* Lockheed Missiles and Space Co., Sunnyvale, Calif.

TESTING FOR THERMAL FATIGUE FAILURES IN SOLAR ARRAYS

G. J. Antonides In NASA. Goddard Space Flight Center Space Simulation, 7th 1973 p 99-10*

CSCL 10A

A temperature cycling test facility has been designed and constructed for the study of thermal stress and fatigue in solar arrays. Two bell jar type thermal vacuum chambers and their associated equipment and instrumentation provide close simulation of the space environment, automatic temperature cycling and data acquisition, and economical operation.

Author

N74-10391# Ecole Polytechnique Federale de Lausanne (Switzerland). Centre de Recherches en Physique des Plasmas. ENERGY: COMPILED BIBLIOGRAPHY AND TABLES OF WORLD RESOURCES, CONSUMPTION, AND WASTES [ENERGIE: COMPILATION BIBLIOGRAPHIQUE ET TABULATION DES RESSOURCES, DE LA CONSOMMATION ET DES DECHETS DANS LE MONDE]

M. Roux Jul. 1973 66 p refs in FRENCH; ENGLISH summary Sponsored by Fonds Natl. Suisse de la Rech. Sci. (LRP-63/73) Avail: NTIS HC \$5.50

reviewed and compared to global consumption of energy. The

The available resources of fossil and nuclear fuels, as well as those of solar energy, hydroelectric power and others, are

per capita and global consumption, together with its growth rate, are presented with respect to primary energy sources and/or main sectors of use. Attention is focused on the energy required by electrical power generation, and estimates up to 2000 are given. Chemical and radioactive nuclear wastes resulting from either energy consumption or electrical power generation are tabulated and scaled to the energy consumption. Wastes from the nuclear economy are estimated up to 2000. The relative biological hazards pertaining to radioactive inventories and fission reactor wastes are compared to those of a reference reactor.

N74-10547*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. PROPERTIES OF SOLID POLYMER ELECTROLYTE FLUORO-CARBON FILM

William B. Alston Washington Nov. 1973 22 p ref (NASA-TN-D-7482; E-7536) Avail: NTIS HC \$2.75 CSCL 11D

The ionic fluorocarbon film used as the solid polymer electrolyte in hydrogen/oxygen fuel calls was found to exhibit delamination failures. Polarized light microscopy of as-received film showed a lined region at the center of the film thickness. It is shown that these lines were not caused by incomplete saponification but probably resulted from the film extrusion process. The film lines could be removed by an annealing process. Chemical, physical, and tensile tests showed that annealing improved or sustained the water contents, spectral properties, thermo-oxidative stability, and tensile properties of the film. The resistivity of the film was significantly decreased by the annealing Author process.

N74-10681# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div. MAGNETOHYDRODYNAMIC METHOD OF OBTAINING

ELECTRICAL ENERGY (COLLECTED ARTICLES) V. A. Kirillina and A. E. Sheidlina 27 Apr. 1973 345 p refs.
Transl. into ENGLISH from the publ. "Magnitogidro Dinarnicheskii
Metod Polucheniya Elektroenergii" Moscow, Energiya, 1968 273 p

(AF Proj. 3144)

(AD-765933; FTD-MT-24-1737-72) Avail: NTIS CSCL 20/9 The report is a Russian translation which discusses various techniques in magnetohydrodynamics for energy conversion.

N74-10715# Bureau of Mines, Bartlesville, Okla. NATURAL GAS AS AN AUTOMOTIVE FUEL, AN EXPERI-MENTAL STUDY

R. D. Fleming and J. R. Allsup 1973 29 p refs (BM-RI-7806) Avail: NTIS HC \$3.50

A study was conducted to evaluate natural gas as an automotive fuel and to provide guidelines for optimum engine adjustments for low exhaust emissions. The study was conducted using a single-cylinder engine, a multicylinder engine, and a total of eight vehicles. Results from single-cylinder engine tests showed that the light-load, lean-limit misfire region for natural gas begins at an air-fuel ratio between 150 and 160 pct of stoichiometric. Changes in ignition timing significantly influenced emissions of nitrogen oxides and hydrocarbons, but had little effect on carbon monoxide emission. Low emissions can be achieved with current-design engines by adjustment of engine parameters, but only with heavy penalty to engine performance. Emissions from vehicles fueled with natural gas are virtually unaffected by ambient temperature change within the range 20 to 100 F.

N74-10747# Chandler Evans, Inc., West Hartford, Conn. VAPOR GENERATOR FEED PUMP FOR RANKINE CYCLE AUTOMOTIVE PROPULSION SYSTEM (CHANDLER EVANS)

R. M. Riordan Dec 1972 213 p (Contract EPA-68-01-0430)

(PB-222849/2; R-679-5; APTD-1357) Avail: NTIS HC \$5.50 CSCL 21G

A project was undertaken to conduct comprehensive design studies pursuant to the selection of conceptual models of vapor generator feed pumps that will satisfy the performance requirement of each of three Rankine cycle automotive power systems currently under development to reduce air pollution. In pursuing the objective of providing variable output pumps for these applications, investigations were conducted of two selected courses: (1) fixed displacement pumps with variable speed drives, and (2) variable displacement pumps. The report presents a detailed summary of the project, describes the technical results, and gives conclusions.

N74-10751 Air Force Systems Command, Wright-Patterson AFB. Ohio. Foreign Technology Div.
AVIATION GAS TURBINE ENGINES (SELECTED POR-

TIONS)

G. S. Zhiritskii, V. I. Lokay, M. K. Maksutova, and V. A. Strunkin Nov. 1972 632 p refs Transl into ENGLISH from the publ. "Gazovyye Turbiny Dvigateley Letatelnykh Apparatov"
Mashinostr., 1971 448 p

(AD-756810; FTD-MT-24-287-72) Avail: NTIS CSCL 21/5 The book will acquaint the reader with the working processes in gas turbines, methods of thermodynamic and gas dynamic calculation of turbines in nominal and variable modes, the system for cooling the hot portions of the turbine and its calculation, various structures, and strength calculations for the principal parts of the turbine. In addition the book gives a brief survey of designs of gas turbines. This book is a textbook for students at Aviation Technical Institutions of Higher Learning. It may also Author (GRA) be useful to gas-turbine designers.

N74-10754*

National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

SOLAR ENERGY TO MEET THE NATION'S ENERGY NEEDS

Frank E. Rom and Ronald L Thomas 1973 26 p refs Presented at Energy Facts for Concerned Citizens: A Natl. Forum, Boiso. Idaho, 26-27 Apr. 1973

(NASA-TM-X-68290; E-7625) Avail: NTIS HC \$3.50 CSCL 10A

Solar energy, being a non-depleting clean source of energy, is shown to be capable of providing energy in all the forms in which it is used today. It can be used to generate electricity, for heating and cooling buildings, and for producing clean renewable gaseous, liquid and solid fuel. There is little question of the technical feasibility for utilizing solar energy. The chief problem is rapidly providing innovative solutions that are economically competititive with other systems. Author

N74-10874# Army Foreign Science and Technology Center, Charlottesville, Va.

CATALYTIC COMBUSTION OF CARBON MONOXIDE IN GASOLINE ENGINE EXHAUST USING MANGANESE CATALYSTS

V. T. Chagunava 7 Mar. 1973 58 p Transl. into ENGLISH of the mono. "Margantsevye Katalizatory Dlya Nekotoryh Reaktsii" USSR, 1969 p 128-174

(FSTC Proj. t7023012301)

(AD-760395; FSTC-HT-23-1248-72) Avail: NTIS CSCL 07/4 In the last 15 to 20 years, complex research work in the lowering of the toxicity of exhaust gases of the internal combustion engine has been done. Out of the various proposed methods, the broadest dissemination was achieved by the method of the catalytic afterburning of the products of incomplete fuel combustion in neutralizers. In the existing catalytic neutralizers that have been constructed abroad as well as in the Soviet Union, platinum either on various carriers or in alloys with other components was used as the catalyzer. Manganese catalyzers for the afterburning of the carbon monoxide in exhaust gases are being investigated in the Academy of Sciences of the Georgian Soviet Socialist Republic. Preliminary results of these investigations are given.

N74-10892# Committee on Science and Astronautics (U. S. House)

ENERGY RESEARCH AND DEVELOPMENT AND SPACE TECHNOLOGY

Washington GPO 1973 574 p refs Hearings before Subcomm. on Space Sci. and Appl. and Subcomm. on Energy, 93d Congr., 1st Sess., No. 9, 7, 22, and 24 May 1973

Avail: Comm. on Sci. and Astronaut.

A Congressional hearing on energy research and development was conducted. The circumstances leading to the present energy crisis are discussed. The various methods for obtaining energy from solar, geothermal, wind, and tidal sources are defined. The projects which are expected to produce new methods for obtaining energy are analyzed.

Author

N74-10896# Committee on Science and Astronautics (U. S. House).

SOLAR ENERGY FOR THE TERRESTRIAL GENERATION OF

Washington GPO 1973 51 p Hearing before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 12, 5 Jun. 1973 Avail: Subcomm. on Energy

The hearings are presented concerning the concept of terrestrial power stations that convert solar energy into electricity. Solar power farms are discussed, and a solar collector system is described.

N74-10898# Army Foreign Science and Technology Center, Charlottesville, Va.

SIGNIFICANT RESEARCH RESULTS FOR 1971, HIGH TEMPERATURE INSTITUTE, USSR ACADEMY OF SCIENCES

25 Jun. 1973 103 p refs Transl. into ENGLISH of the publ. "Vazhneishie Rezultaty Nauchno-Vysokikh Temperatur, Akademii Nauk SSSR" Moscow, Nauka, 1972 (AD-765753; FSTC-HT 23-1016-73) Avail: NTIS CSCL 07/4

The Institute's work continued in 4 basic directions in 1971: (a) study of thermophysical and electrophysical properties of substances at high temperatures: (b) study of high-temperature heat and mass transfer and gas dynamics processes: (c) development and study of new heat-resistant structural materials; and (d) research toward development of direct conversion of heat into electricity using MHD generators and other new types of energy units. Properties of plasmas, especially of cesium plasmas, at high temperatures (p + or - 500 atm, t + or - 5000K and higher) were studied. Measurements made by the electrical explosion method were made on Fe, Ni, W, Mo and various transition group metals (entropy, enthalpy, heats of fusion, for example). Experimental and theoretical determination of phase diagrams, of e.g. Li-LiH-H2 systems, were prepared, especially at high temperatures and low pressures. Heat and mass transfer and gas dynamics properties of high-temperature heat transfer agents was emphasized. ZrO2-Y2O3-CeO2 based electrodes, as well as LaCrO2-Cr, cermetselectrodes, and high-alumina MgO base cements for insulating materials were studied for MHD applications. The U-25 MHD (magnetohydrodynamics) unit was started up and successfully run in 1971. Power of 75 kW was achieved in MHD generator tests. Various MHD channel configurations were tested extensively. Theoretical studies on the most efficient uses of MHD generators in an electrical power network were made, especially as to their use to carry peak loads on a system. GRA

N74-10944*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

THE USE OF FEP TEFLON IN SOLAR CELL COVER TECHNOLOGY

Jacob D. Broder and George A. Mazaris 1973 4 p refs Presented at the 10th Photovoltaic Specialists Conf., Palo Alto, Calif., 13-15 Nov. 1973

(NASA-TM-X-71485; E-7813) Avail: NTIS HC \$3.00 CSCL 108

FEP plastic film was used as a cover and as an adhesive to bond cover glasses to silicon solar cells. Various anti-reflective

coatings were applied to cells and subsequently covered with FEP. Short circuit currents were measured before and after application of the coating and of the FEP. FEP was bonded to seven of the nine differently coated cells, with no change in the total short circuit current in four cases.

N74-10946*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.

ELECTRIC VEHICLE BATTERY RESEARCH AND DEVELOP.
MENT

Harvey J. Schwartz 1973 18 p refs Presented at the Electrochem. Soc. Meeting, Boston, 7-11 Oct. 1973 (NASA-TM-X-71471; E-7772) Avail: NTIS HC \$3.00 CSCL 10C

High energy battery technology for electric vehicles is reviewed. The state-of-the-art in conventional batteries, metal-gas batteries, alkali-metal high temperature batteries, and organic electrolyte batteries is reported.

N74-10947*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE MULTIPLE JUNCTION EDGE ILLUMINATED SOLAR CELL

B. I.-Sater, H. W. Brandhorst, Jr., T. J. Riley, and R. E. Hart, Jr. 1973 B p refs Presented at 10th Photovoltaic Specialists Conf., Palo Alto; Calif., 13-15 Nov. 1973; Sponsored by IEEE (NASA-TM-X-71476; E-7795) Avail: NTIS HC \$3.00 CSCL 10B

The multiple junction edge illuminated solar cell was devised for high voltage low current applications. Devices to be flight tested in early 4974 with 96 series connected PNN+ junctions in a 2 cm X-2.3 cm size deliver 36 volts at 1 milliampere. Test data of M-J cells fabricated with resistivities of 10, 50, 100, 200, 450, and 1000 ohm cm silicon are presented and problem areas are discussed. An additional potential application of the M-J cell lies in ultilization of its high intensity performance that has been demonstrated at levels in excess of 100 AMO suns.

Author

N74-10948*# Linguistic Systems, Inc., Cambridge, Mass. INFLUENCE OF WIND FREQUENCY ON ROTATIONAL SPEED ADJUSTMENTS OF WINDMILL GENERATORS

Ulrich Hutter Washington NASA Nov. 1973 17 p Transl. into ENGLISH from Z. Elektrotech. (Stuttgart), v. 1, no. 6, 1948 p 117-122

(Contract NASw-2482)

(NASA-TT-F-15184) Avail: NTIS HC \$3.00 CSCL 10A

In installing groups of windmill generators to produce electric power from the force of the wind, it is important to locate the units of such a network in such fashion that the so-called two-minute variation of the wind velocity can be overcome. This is done by using at least three windmill generators located an appropriate distance apart. When the wind velocity is insufficiently great to drive the blades of the windmills, a source of power should be available (battery, power from other windmills) to keep the blades turning. Contrary to popular misconception, changing the angle of attack of the windmill blades does not improve the efficiency of their operation or increase the power of the windmill.

N74-10949# General Electric Co., Philadelphia, Pa. Space

CLOSED CYCLE MHD FOR CENTRAL STATION POWER WITH FOSSIL OR NUCLEAR FUELS

Bert-Zauderer, Charles H. Marston, and Charles S. Cook Aug. 1973 48 p. refs

(Contract N00014-73-C-0039; AF Proj. 9800)

(AD-766500; Rept-73SD231; ONR-TR-20) Avail: NTIS CSCL 10/2

A closed cycle MHD generator using a noble gas with alkali metal vapor as the working fluid, when used as a topping unit for a conventional steam plant, can yield cycle efficiencies in excess of 60% at peak stagnation temperature of 3000F. While

high enough for substantial gains in thermodynamic efficiency, this temperature is relatively low for an electrically conducting gas and conductivity is achieved by decoupling electron temperature from gas temperature. A ceramic regenerative heat exchanger supplies thermal energy to the working fluid. The latter can be any clean fossil fuel, preferably low BTU (about 150 BTU/SCF) coal gas. With multi-stage combustion, pulverized coal is also a possible fuel. On a long range basis, closed cycle MHD is ideally suited for high temperature gas cooled fission reactors and probably also to fusion reactors. The closed cycle MHD generator is adaptable to the Brayton cycle, the regenerative Brayton cycle and eventually the Rankine cycle. Author (GRA)

N74-10950# General Electric Co., Philadelphia, Pa. Missile and Space Div.

INVESTIGATION OF A NON-EQUILIBRIUM MHD GENERA-TOR Annual Report, 1 Aug. 1972 - 31 Jul. 1973

Bert Zauderer Aug. 1973 34 p refs

(Contract N90014-73-C-0039; NR Proj. 9800)

(AD-766493) Avail: NTIS CSCL 10/2

The report presents research results on the following: The ST-40 MHD channel: The 4 Tesla Magnet for the ST-40 MHD channel; MHD generator theoretical analyses; Gas dynamic performance, ST-40 channel; MHD generator performance. ST-40 channel: Electrode conduction studies.

N74-10951# American Univ., Washington, D.C.
RESEARCH ON ELECTROCHEMICAL ENERGY CONVER-SION SYSTEMS Interim Technical Report, Oct. 1972 - Apr.

Alayne A: Adams, Robert T Foley, and Richard M. Goodman Jun. 1973 59 p refs

(Contract DAAK02-72-C-0084; DA Proj. 1T0-61102-A-34A) (AD-766329; ITR-3) Avail: NTIS CSCL 10/2

The research on electrochemical energy conversion systems has involved work on two tasks: a search for electrolytes alternative to phosphoric acid for direct and indirect hydrocarbonair fuel cells, and a study of the corrosion characteristics of electrolytes for intermediate-temperature hydrocarbon-air fuel cells. The work during this reporting period was concentrated on the first task. Two alternative electrolytes, trifluoromethenesulfonic acid monohydrate and dichloroacetic acid, representative of two classes of compounds, were studied in some depth. The first compound shows definite promise as an alternative electrolyte. It is physically and electrochemically stable up to 135C for periods of time up to six weeks. The limiting current density for the oxidation of propane at 135C is approximately 15 times that observed in H3PO4 at the same temperature. Certain problems associated with the use of dichloroacetic acid were encountered. These were interpreted in terms of the state of the unbound Author (GRA) water in the electrolyte.

N74-10952# Argonne National Lab.- III. EXPERIMENTAL TWO-PHASE LIQUID-METAL MAGNETO-HYDRODYNAMIC GENERATOR PROGRAM Annual Report, 1 May 1972 - 1 May 1973
W. E. Amend, R. Cole, J. C. Cutting, and L. C. Pittenger Jun.

1973 79 p refs

(Contracts NAonr-19-72; NAonr-16-73; RF0180206;

RR0240302)

(AD-766588; ANL-ENG-73-02) Avail: NTIS CSCL 10/2

Extensive data on the contoured generator has been taken which corroborates the very preliminary data reported previously. Detailed experimental parametric studies were completed which mapped generator performance as a function of mixture quality, magnetic field, and generator loading. Turbine efficiencies of 50% have been achieved for the first-generation contoured The experimental data, coupled with theoretical analyses and modeling, however, has shown conclusively that an electrical shunt exists within the generator. Extensive data has also been taken on the generator with constant crosssectional inserts; similar results were obtained. Several possible causes for the electrical shunt were identified. In order to identify and isolate the principal electrical shunt, the following steps were taken: The generator was redesigned and rebuilt to completely eliminate leakage and thus the shunt behind the

insulator wall; a gas-cleaning system and a micropore NaK filter was installed to minimize the amount of gas impurities that could enter the test facility and remove any oxides as soon as they are formed. These steps were successfully carried out and a new series of performance runs are planned. As the testing proceeds, we will be able to separate the effects of the mechanical and fluid boundary-layer-type shunts. Control of the boundarylayer shunt will be accomplished with a gas injection system. (Modified author abstract)

N74-11148*# Texas Instruments, Inc., Dallas. Services

ERTS-1 IMAGERY USE IN RECONNAISSANCE PROSPECT-ING: EVALUATION OF THE COMMERCIAL UTILITY OF ERTS-1 IMAGERY IN STRUCTURAL RECONNAISSANCE FOR MINERALS AND PETROLEUM Interim Report, 1 Mar. - 31 Aug. 1973

D. F. Saunders, Principal Investigator, G. Thomas, and F. E. Kinsman Sep. 1973 37 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198

(Contract NAS5-21796)

(E74-10007; NASA-CR-135848; U1-702700-2) Avail: NTIS

HC \$4.00 CSCL 08G

The author has identified the following significant results. Five areas of North America (North Slope, Alaska; Superior Province, Canada; Williston Basin, Montana; Colorado; and New Mexico-West Texas) are being studied for discernibility of geological evidence on ERTS-1 imagery. Evidence mapped is compared with known mineral/hydrocarbon accumulations to determine the value of the imagery in commercial exploration programs. The conclusion is that there is a great advantage in photogeologic interpretation from the satellite viewpoint to provide a truly synoptic examination of regional geologic features. In addition to detecting lineaments which may be continental in scale, many large circular or curvilinear tonal or dissection patterns not generally detected on conventional aerial photos have been discovered. Preliminary analysis of these lineaments and curvilinear anomalies has established close empirical relationships between these features and both mineral deposits and the structure of sedimentary basins. Details are presented of the Colorado region interpretation.

N74-11159*# State of Chio Dept. of Development, Columbus. RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Sep. - Oct. 1973

David C. Sweet, Principal Investigator Oct. 1973 8 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls. S. D. 57198 ERTS

(Contract NAS5-21782)

(E74-10024; NASA-CR-135865) Avail: NTIS HC \$3.00 CSCL

There are no author-identified significant results in this report.

N74-11182*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.

INTERDISCIPLINARY APPLICATIONS AND INTERPRETA-TIONS OF ERTS DATA WITHIN THE SUSQUEHANNA RIVER BASIN (RESOURCE INVENTORY, LAND USE, AND POLLUTION) Annual Report, 1 Jun. 1972 - 30 May 1973 George J.-McMurtry and Gary W. Petersen, Principal Investigators Oct. 1973 260 p. refs. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS (Contract NAS5-23133)

(E74-10061; NASA-CR-135961; ORSER-SSEL-TR-9-73) Avail:

NTIS HC \$15.00 CSCL 08H The author has identified the following significant results. An interdisciplinary group at Penn State University is analyzing

ERTS-1 data. The geographical area of interest is that of the

Susquehanna River Basin in Pennsylvania. The objectives of the

work have been to ascertain the usefulness of ERTS-1 data in

the areas of natural resources and land use inventory, geology and hydrology, and environmental quality. Specific results include a study of land use in the Harrisburg area, discrimination between types of forest resources and vegetation, detection of previously unknown geologic faults and correlation of these with known mineral deposits and ground water, mapping of mine spoils in the anthracite region of eastern Pennsylvania, and mapping of strip mines and acid mine drainage in central Pennsylvania. Both photointerpretive techniques and automatic computer processing methods have been developed and used, separately and in a combined approach.

N74-11188°# Geological Survey, Washington, D.C. SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND Progress Report, 15 Jan. 31 Aug. 1973.

Richard S. Williams, Jr., Principal Investigator 1 Sep. 1973 28 p refs ERTS

(NASA Order S-70243-AG)

(E74-10073; NASA-CR-135816) Avail: NTIS HC \$3.50 CSCL OBG

The author has identified the following significant results. Under a binational, multidisciplinary experiment ERTS-1 imagery is being used to measure and map dynamic natural phenomena in Iceland. A few of the initial results from the project are: (1) a large variety of geological and volcanic features can be studied, particularly on imagery acquired at low sun angle (< 10 deg), which have not been previously recognized; (2) under optimum snow cover conditions, geothermal areas can be discerned by their snowmelt pattern or by warm spring discharge into frozen lakes: (3) a variety of map types at scale of 1:1,000,000 and 1:500,000, can be compiled, made more accurate, or updated (changes in coastline, glaciers, lakes, etc.); (4) the persistence of snow in the highland areas, during the summer months, has important ramifications to rangeland management; (5) false color composites (MSS) permitted the mapping of four types of vegetation; forested, reclaimed, cultivated areas and grasslands, and the mapping of the seasonal change of the vegetation, all of high value to rangeland management when complete, repetitive coverage of Iceland becomes a reality with an operational satellite; and (6) the volcanic eruption on Heimaey was recorded.

N74-11195*# Indiana Geological Survey, Bloomington.
STUDY OF APPLICATION OF ERTS-A IMAGERY TO
FRACTURE-RELATED MINE SAFETY HAZARDS IN THE
COAL MINING INDUSTRY Progress Report, 1 Sep. - 1 Nov.
1973

Charles E. Wier, Frank J. Wobber, Principal Investigators, Orville R. Russell, Roger V. Amato, and Thomas Leshendok 9 Nov. 1973 9 p Prepared in cooperation with Earth Satellite Corp., Washington, D. C. ERTS

(Contract NASS-21795)

(E74-10083; NASA-CR-135972) Avail: NTIS HC \$3.00 CSCL 08)

The author has identified the following significant results. The Mined Land Inventory map of Pike, Gibson, and Warrick Counties, Indiana, prepared from ERTS-1 imagery, was included in the 1973 Annual Report of the President's Council on Environmental Quality as an example of ERTS applications to mined lands. Increasing numbers of inquiries have been received from coal producing states and coal companies interested in the Indiana Program.

N74-11395 Environmental Protection Agency, Research Triangle Park, N.C. Div. of Meteorology.

APPLICATIONS OF METEOROLOGY TO NATURAL RE-SOURCE PLANNING

James T. Peterson In WMO Selected Papers on Meteorol. as Related-to the Human Environ. 1971 p 93-100

Copyright.

The application of meteorology to the planning and management of natural resources is discussed. Weather components -

frost, rain, wind, erosion - having an effect on agriculture, forestry, and recreational facilities are reviewed. Energy natural resources are considered, and ways of getting better utilization are discussed. Finally man's effect on natural ecological systems is described.

ESBC

N74-11519# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SELF-CONTAINED LOW POWER ATOMIC PLANTS

A. M. Petrosyants 27 Aug. 1973 12 p Transl into ENGLISH from the publ. "Ot Nauchaogo Poiska k Stomnoi Promyshlennosti" USSR, 1972 p 198-203

(AD-766969: FTD-HT-23-702-73) Avail: NTIS CSCL 18/5
The report discusses research in the USSR into the direct conversion of thermal (nuclear) energy into electrical, including thermionic, thermoelectrical, and MHD methods.

N74-11592# Bureau of Mines, Bartlesville, Okla. Energy Research Center.

AVIATION TURBINE FUELS, 1972 Petroleum Products Survey No. 79

Ella Mae Shelton Mar. 1973 15 p refs

Avail: NTIS HC \$3.00

Properties of aviation turbine fuels produced in the United States during 1972 are reported in accordance with a cooperative agreement between the American Petroleum Institute and the Bureau of Mines of the United States Department of the Interior. By agreement with the American Petroleum Institute, identification of the dute by item number is confidential. Analytical data are presented for 117 samples of aviation turbine fuels, representing the products of 16 companies. The data were reported by the manufacturers as typical of their 1972 production. The analyses were made in their laboratories and the results submitted to the Bureau of Mines for compilation.

N74-11672* European Space Research and Technology Center. Noordwijk (Netherlands).

CURRENT EUROPEAN DEVELOPMENTS IN SOLAR PADDLE DRIVES

R. H. Bentall In NASA. Langley Res. Center The 8th Aerospace Mech. Symp. Oct. 1973 p 49-58 refs

CSCL 22B

The European Space Research and Technology Centre (ESTEC) is sponsoring the development of a number of critical spacecraft hardware items. The hardware under development includes two competing solar paddle drives which are being produced to similar specifications. Three mechanisms of each type are being produced and will undergo thermal vacuum testing. All mechanisms have lead lubricated bearings.

N74-11727*# Houston Univ., Tex. Systems Design Inst.
A HYDROGEN ENERGY CARRIER. VOLUME 1: SUM-MARY

Robert L. Savage, ed., Lee Blank, ed., Tom Cady, ed., Kenneth Cox, ed., Richard Murray, ed., and Richard Dee Williams, ed. Sep. 1973 27 p

(Grant NGT-44-005-114)

(NASA-CR-135995) Avail: NTIS HC \$3.50 CSCL 20M

The production, technology, transportation, and implementation of hydrogen into the energy system are discussed along with the fossil fuel cycle, hydrogen fuel cycle, and the demands for energy. The cost of hydrogen production by coal gasification; electrolysis by nuclear energy, and solar energy are presented. The legal aspects of a hydrogen economy are also discussed.

F.O.S.

N74-11728*# Houston Univ., Tex.
A HYDROGEN ENERGY CARRIER. VOLUME 2: SYSTEMS ANALYSIS

Robert L. Savage, ed., Lee Blank, ed., Tom Cadv. ed., Kenneth Cox, ed., Richard Murray, ed., and Richard Dee Williams, ed. Sep. 1973 158 p refs

(Grant NGL-44-005-114)

(NASA-CR-136007) Avail: NTIS HC \$10.00 CSCL 20M

A systems analysis of hydrogen as an energy carrier in the United States indicated that it is feasible to use hydrogen in all energy use areas, except some types of transportation. These use areas are industrial, residential and commercial, and electric power generation. Saturation concept and conservation concept forecasts of future total energy demands were made. Projected costs of producing hydrogen from coal or from nuclear heat combined with thermochemical decomposition of water are in the range \$1.00 to \$1.50 per million Btu of hydrogen produced. Other methods are estimated to be more costly. The use of hydrogen as a fuel will require the development of large-scale transmission and storage systems. A pipeline system similar to the existing natural gas pipeline system appears practical, if design factors are included to avoid hydrogen environment embrittlement of pipeline metals. Conclusions from the examination of the safety, legal, environmental, economic, political and societal aspects of hydrogen fuel are that a hydrogen energy carrier system would be compatible with American values and the existing energy

N74-11729* Houston Univ., Tex. ISUMMARY OF SYSTEMS ANALYSIS OF HYDROGEN AS AN FNERGY CARRIER IN THE UNITED STATES In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 1-3

Hydrogen is discussed in terms of meeting the energy demands of the current energy shortage in the U.S. Hydrogen is considered compatible with all fuel needs, except for on-board storage in automotive-type vehicles. Handling and safety factors are considered compatible to other high energy fuel. It is concluded that hydrogen is an environmentally desirable energy source. and is readily acceptable in the American energy system. F.O.S.

N74-11730* Houston Univ., Tex. CURRENT ENERGY SHORTAGE IN THE UNITED STATES] In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 5-12

refs CSCL 20M

An overview is presented of the study to use hydrogen as an energy source for meeting the current energy shortage. The fossil fuel cycle, and the hydrogen fuel cycle are discussed along E O.S with energy flow patterns.

N74-11731* Houston Univ., Tex. PRODUCTION OF HYDROGEN

In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 13-59 refs

CSCL 20M

Methods for producing hydrogen for a hydrogen economy are analyzed. Solar, wind, coal, and nuclear energies are considered as primary sources of energy for the electrolysis of water. Coal gasification processes are discussed along with thermochemical water decomposition by closed cycle processes. F.O.S.

N74-11732* Houston Univ., Tex. TRANSMISSION AND STORAGE OF HYDROGEN In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 61-76 refs CSCL 20M

Transmission and storage techniques for hydrogen are evaluated. Gaseous hydrogen and natural gas systems are discussed along with liquid hydrogen systems, and solid hydride storage systems are described. It is concluded that hydrogen gas pipeline systems are feasible, but attention must be given to the embrittlement of pipeline metals. F.O.S.

N74-11734* Houston Univ., Tex. SAFETY, LEGAL. ENVIRONMENTAL ECONOMIC. POLITI-CAL AND SOCIAL ASPECTS OF HYDROGEN In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 117-146

CSCL 05C

The impact of the hydrogen energy system on society was studied. Areas discussed include: federal and state responsibilities for safety; appliance safety standards; industrial uses and safety; assessment of the danger in the widespread use of hydrogen: legal aspects of the energy system; and the environmental implications.

N74-11736* Houston Univ., Tex. IMPLEMENTATION OF A HYDROGEN ENERGY CARRIER CVCTEM

In its A Hydrogen Energy Carrier, Vol. 2 Sep. 1973 p 147-151

CSCL 13H

A program for the implementation, by stages, of a hydrogen energy system is proposed based on established methods of production, distribution, and use. The stages for the production of hydrogen progresses from coal gasification, through nuclear power to a hydrogen society.

N74-11736*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. FIGURE-OF-MERIT CALCULATION METHODS FOR OR-GANIC HEAT-PIPE FLUIDS

James F. Morris Washington Nov. 1973 13 p refs (NASA-TM-X-2945; E-7632) Avail: NTIS HC \$2.75

With only chemical formulas and operating temperatures specified, selected correlating equations and tables of chemistryeffect functions allow estimates of figures of merit for organic Author heat-pipe-fluids.

N74-11739# Brown, Boveri und Cie, A.G., Heidelberg (West Germany). Zentrales Forschungslab.

A NOVEL METHOD OF COOLING SEMICONDUCTOR DEVICES FOR POWER ELECTRONICS [NEUARTIGES KUEHLVERFAHREN FUER BAUELEMENTE DER LEIS-TUNGSELEKTRONIK]

Hermann Birnbreier, Gregor Gammel, Uwe Heidtmann, Mattias Joens, and Peter Pawlowski Bonn Bundesmin, fuer Forsch. und Technol. Apr. 1973 114 p refs in GERMAN; ENGLISH summary Sponsored by Bundesmin, fuer Forsch, und Technol. (BMFT-FB-T-73-02) Avail: NTIS HC \$7.75; ZLDI, Munich 23.55 DM

The development of heat pipe coolers for semiconductors in electric power supplies is discussed. The maximum dimensions were calculated for a given heat flux capability. Technologies necessary for the construction of heat pipes were developed. such as the manufacturing of capillary structures as well as the filling and sealing of heat pipes. Various samples of different design were built, and the influence of heat throughput, heat pipe position, and cooling air velocity on the heat resistance and temperature distribution were experimentally determined. The startup behavior of a heat pipe cooler was examined at room temperature and at temperatures below the freezing point of the working fluid. Corrosion tests performed so far have shown that the material combination copper-water is suitable for heat pipe coolers within the desired temperature range and that prospective lifetimes can be reached.

N74-11743*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering.

THE ENERGY DILEMMA AND ITS IMPACT ON AIR TRANSPORTATION

Calvin R. Dyer, ed., Michael Z. Sincoff, ed., and Paul D. Cribbins, ed. 1973 171 p refs (Grant NGT-47-003-028)

(NASA-CR-135993) Avail: NTIS HC \$10.75 CSCL 05A The dimensions of the energy situation are discussed in relation to air travel. Energy conservation, fuel consumption, and combustion efficiency are examined, as well as the proposal for subsonic aircraft using hydrogen fuel.

N74-11744* Old Dominion Univ., Norfolk, Va. THE ENERGY SITUATION

In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 1-48 refs CSCL 05A

Energy reserves from the principal energy sources other than petroleum and natural gas are summarized. It was found that energy sources are being consumed at rates which exceed the ability to replace them through new discoveries and technology improvements. The costs and implications to environment for using coal and nuclear energy are discussed. Tables are presented on energy consumption, cost of reclamation, and water power capacity.

N74-11745* Old Dominion Univ., Norfolk, Va. THE AIR TRANSPORTATION/ENERGY SYSTEM

In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 49-70 refs CSCL 05A

The changing pattern of transportation is discussed, and the energy intensiveness of various modes of transportation is also analyzed. Sociopsychological data affecting why people travel by air are presented, along with governmental regulation and air transportation economics. The aviation user tax structure is shown in tabular form.

N74-11746* Old Dominion Univ., Norfolk, Va. ENERGY CONSERVATION AND AIR TRANSPORTATION In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 71-94 refs CSCL 05A

Air transportation demand and passenger energy demand are discussed, in relation to energy conservation. Alternatives to air travel are reviewed, along with airline advertising and ticket pricing. Cargo energy demand and airline systems efficiency are also examined, as well as fuel conservation techniques. Maximum efficiency of passenger aircraft, from 8-747 to V/STOL to British Concorde, is compared.

N74-11747* Old Dominion Univ., Norfolk, Va. AN INITIAL STEP: A DEMONSTRATION PROJECT In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 95-117 refs CSCL 05A

To initiate the transition into a clean and diverse energy environment independent of fossil-based fuels, the rapid development of a subsonic, hydrogen-fueled aircraft is recommended. Tables are presented on characteristics of synthetic fuels, comparisions with JP-4 and gasoline, comparison of nitric oxide emissions from hydrocarbon and hydrogen fuels vs. final flame temperature, and sensitivity limits of LH2 detectors.

J.A.M.

N74-11748* Old Dominion Univ., Norfolk, Va. CONCLUSIONS AND RECOMMENDATIONS

In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 119-173 refs CSCL 05A

Conclusions and recommendations are presented for an analysis of the total energy situation; the effect of the energy problem on air transportation; and hydrogen fuel for aircraft. Properties and production costs of fuels, future prediction for energy and transportation, and economic aspects of hydrogen production are appended.

J.A.M.

N74-11759 Joint Publications Research Service, Arlington, Va. TRENDS IN THE MECHANIZATION OF THE COAL INDUSTRY AND GUARANTEE OF PATENT-ABILITY OF DESIGNS THAT ARE COMPETITIVE ON THE WORLD TECHNOLOGICAL LEVEL

V. L. Shteynbuk In its Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 105-112 ref Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev. Naukova Dumka, 1967 p 106-113

An analysis of the historical trends in the development of mechanized hydraulic supports for the USSR coal industry is given; the relationships to problems of legal protection, patenting, patent purity, and future requirements in worldwide competition are discussed. It is proposed that computerized analysis of historical and technical experience is included in the processing of technological inventions pertaining to mechanized hydraulic supports.

N74-11760 Joint Publications Research Service, Arlington, Va. THE HISTORY OF TECHNOLOGY AND ENGINEERING SOLUTIONS

O. F. Schukin In its Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 113-114 Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 114-115

Mathematical methods and computer processing of accumulated technological and engineering data are essential in forecasting the development and operation of modern coal mines. The blueprint for construction of a modern coal mine should include considerations of technological progress and economic aspects in planning and design organization.

N74-11765 Joint Publications Research Service, Arlington, Va. FORECASTING OF TECHNOLOGICAL PROGRESS FOR LONG-RANGE PLANNING OF MINING OPERATIONS AT COAL MINES

A. M. Arabadzhev, G. M. Dobrov, N. I. Ivanov, and L. P. Smirnov in its Anal. of Tendencies and Forecast of Sci.-Tech. Progr. (JPRS-60402) 30 Oct. 1973 p 141-148 refs Transl. into ENGLISH of the book "Analiz Tendentsiy i Prognozirovaniye Nauchno-Tekhnicheskogo Progressa" Kiev, Naukova Dumka, 1967 p 141-148

Ideas, principles, and decisions that result from scientific-technical research are included in forecasting the development of coal field reserves and planning for coal mine operations. The process of mine development planning is represented as a multistage industrial process, distributed in time and space, where specific loads are increased by improved technology and operational organization to yield practical conclusions. An algorithm is developed that solves the feasibility problem of converting from one qualitative state (old equipment) to a new one, corresponding to the decision to replace the old equipment which has exhausted its technical and economic capabilities.

G.G.

N74-11787# Committee on Science and Astronautics (U. S. Hnuse)

SOLAR-ENERGY FOR HEATING AND COOLING

Washington GPO 1973 295 p refs Hearings before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 13, 7 and 12 Jun. 1973

Avail: Subcomm. on Energy

A Congressional hearing was conducted to examine the use of solar energy for heating and cooling. Examples of various solar energy conversion systems are illustrated and described. The subjects discussed are: (1) the status of solar energy technology, (2) market factors, (3) technology transfer, and (4) the benefits of using solar energy for heating and cooling buildings.

P.N.F.

N74-11788# Committee on Science and Astronautics (U. S. House)

ENERGY RESEARCH AND DEVELOPMENT: AN OVERVIEW OF OUR NATIONAL EFFORT

Washington GPO 1973 51 p Hearing before Comm. on Sci.

and Astronaut., 93d Congr., 1st Sess., No. 10, 15 May 1973 Avail: Subcomm. on Energy

A Congressional hearing was conducted to discuss the research and development efforts directed toward providing sources of energy. The funds available for research and development by government and private agencies are presented. The various alternate sources of energy are described to show the level of effort for each source. The long range priorities which involve the development of new energy sources and the conservation of energy are analyzed. Examples of alternate energy sources are included to show specific techniques for energy conversion.

P.N.F.

N74-11790# RAND Corp., Santa Monica, Calif. ENERGY DEMAND AND ITS EFFECT ON THE ENVIRONMENT

D. N. Morris Jul. 1973 28 p (P-5048) Avail: NTIS HC \$3.50

An analysis of the current energy crisis and the possible environmental factors involved in the use of alternate sources of energy to reduce the consumption of fossile fuels is presented. Graphs are developed to show: (1) energy use in the United States, (2) total U.S. crude oil production from 1860 to 2060, (2) consumption of electricity in California, and (4) commercial, residential, and industrial electrical use in California. Measures for conserving electricity are proposed. The estimated national air pollution emission by source in 1969 is shown in table form.

N74-11791# RAND Corp., Santa Monica, Calif. ENERGY TRENDS AND THEIR FUTURE EFFECTS UPON TRANSPORTATION

W. E. Mooz Jul. 1973 27 p refs (P-5046) Avail: NTIS HC \$3.50

The impact of fuel shortages on the transportation energy is discussed. The areas investigated are: (1) the demand for energy for transportation purposes, (2) the supply of energy for transportation purposes, and (3) the espected price of energy. Graphs are included to show the overall energy requirements, comparative energy intensiveness values for different methods of transportation, recent trends in automobile fuel use, a history of rail, truck, and air cargo development, and an analysis of annual energy consumed by all transport modes in the United

N74-11795# interTechnology Corp., Warrenton, Va. THE U.S. ENERGY PROBLEM. VOLUME 2: APPENDICES. PART A Final Report, Dec. 1970 - Nov. 1971 G. C. Szego 1971 745 p refs 2 Vol. (Grant NSF C-645)

(PB-207518; NSF-RANN-71-1-2) Avail: NTIS HC \$12.50 CSCL 10B

The energy status and outlook for the United States and the World are analyzed. A simulation model of fossil fuel steam electric generating plants is developed. The model includes the following features: (1) cost tradeoff analysis, (2) influence coefficients, (3) cost reduction versus technology, (4) cost of fossile fuels, (5) magnetohydrodynamic topping, (6) nuclear energy, (7) residential energy analysis, and (8) solar energy.

N74-11796# InterTechnology Corp., Warrenton, Va. THE U.S. ENERGY PROBLEM. VOLUME 2: APPENDICES, PART B Final Report, Dec. 1970 - Nov. 1971 G. C. Szego Nov. 1971 686 p refs 2 Vol. (Grant NSF C-645) (PB-207519; NSF-RANN-71-1-3) Avail: NTIS HC\$12.50 CSCL 10B

An analysis of the energy requirements and energy sources for the United States is presented. The subjects discussed are: (1) off-peak storage, (2) state of electrochemical research and development of fuel cells, (3) afternate energy conversion cycles, (3) effects of failures of cryogenic superconductivity on electrical transmission lines, (4) transportation requirements, (5) environmental factors, (6) future investment capital for public utilities,

(7) supply and demand analysis for energy related minerals, (8) econometric model for primary industries, (9) technology of alternate fuels, (10) a petroleum refinery model, and (11) the current state of thermionic energy conversion technology.

Author

N74-11828# National Aviation Facilities Experimental Center, Atlantic City, N.J.

AIRCRAFT FUEL SYSTEM TESTS WITH GELLED FUEL-FLOWMETER CALIBRATION, FUEL BOOST PUMP AND JETTISON TESTS Final Report, Dec. 1971 - Nov. 1972 Joseph A. Avbel Nov. 1973 29 p refs (FAA Proj. 181-520-020)

(FAA-NA-73-43: FAA-RD-73-138) Avail: NTIS HC \$3.00

The feasibility of using gelled fuel (nominal 250 centipoise viscosity) with full scale aircraft fuel system components was investigated. Tests indicated that turbine-type flowmeters are suitable for measuring flow rates with accuracies of 1 percent. Jettison and fuel feed operations were conducted using a B-57 wing fuel tank. Approximately 3 percent more gelled fuel than JP-5R remained in the tank after emptying the tank in both boost pump and jettison tests. Flow rates and times to empty the tank were significantly poorer with the gelled fuel when compared to the results obtained with the JP-5R fuel. The gelled fuel tested is considered unsatisfactory because of its instability in storage, causing wide variations in viscosity.

N74-11849# Atomic Energy Commission, Washington, D.C. ENERGY R AND D INVENTORY DATA BASE. BIBLIOGRAPHY, 1973

1973 439 p refs Avail: NTIS HC \$24.00

The bibliography provides separate listings which include: (1) index on authors, (2) simple index on corporate authors, (3) permuted index on titles, (3) energy sources (arranged according to the various types), (4) electric power generation (subdivided by type), and (5) energy demand and uses.

D.L.G.

N74-11851# Dartmouth Coll., Hanover, N.H. Thayer School of Engineering.

Si-Au SCHOTTKY BARRIER NUCLEAR BATTERY Ph.D. Thesis

A. N. Tse Nov. 1972 168 p refs Sponsored by AEC (TID-26342) Avail: NTIS HC \$7.60

A long life, high power density, high reliability, compact microwatt battery is needed in many applications. In the field of medicine, for example, such a battery could power an artificial pacemaker which would greatly extend the residence time of the device. Various alternatives are analyzed and discussed. Betavoltaic conversion systems with Si-Au Schottky barrier cells coupled with Pm 147 metal foil were selected for investigation. Characterization experiments were performed to obtain optimized silicon resistivity and promethium metal foil thickness. Radiation dose rates were measured and the safety aspects of the battery were analyzed. A prototype battery was assembled and tested. The economics of the battery were demonstrated for special applications. It is concluded that a microwatt nuclear battery can be built with a conversion efficiency of 1 to 2%, a power density of 60 to 300 microwatts/cu cm depending on the power level, and a useful life of 5 to 10 years. Further research areas are recommended. Author (NSA)

N74-11852# ARO, Inc., Arnold Air Force Station, Tenn.
DEVELOPMENT OF DESIGN CRITERIA, COST ESTIMATES,
AND SCHEDULES FOR AN MHD HIGH PERFORMANCE
DEMONSTRATION EXPERIMENT Final Report, Apr. 1972 Apr. 1973

G. W. Garrison, T. R. Brogan, H. J. Schmidt, and J. J. Nolan AEDC Aug. 1973 119 p refs Sponsored by Office of Coal Res.

(ARO Proj. PF226)

(AD-766232; ARO-PWT-TR-73-75; AEDC-TR-73-115) Avail: NTIS CSCL 10/2

The successful application of magnetohydrodynamics (MHD) for commercial, coal-fired, base-load power generation requires that the generator have an energy extraction ratio of approximately 0.20 with a turbine efficiency of 70 percent. There is a significant gap between this required performance and the generator performance which has been achieved to date. The commercial MHD concept is critically dependent upon the generator achieving this required performance, and it is therefore essential that a demonstration of this generator performance have the highest priority. Of equal importance, the generator channel configuration and operating conditions which are necessary in order to achieve the required performance will be determined while accomplishing the performance demonstration. Thus other Office of Coal Research (OCR) sponsored MHD research efforts can be directed toward the real problems and configurations as determined by solid experiments. (Modified author abstract)

N74-11941# National Academy of Sciences - National Research Council, Washington, D.C.

SUBSTITUTE CATALYSTS FOR PLATINUM IN AUTO-MOBILE EMISSION CONTROL DEVICES AND PETROLEUM REFINING Final Report

Mar. 1973 110 p

(Contract GS-00-DS-(P)-94008)

(PB-222167/9; NMAB-297) Avail: NTIS HC \$5.45 CSCI

The technological potential is reported of catalysts other than platinum as economic and efficient substitutes for platinum in petroleum refining and automobile emission devices for control of atmospheric pollution. Much research is being done to develop base-metal catalysts but at present they are only one percent as active as platinum per unit amount of metal under practical conditions in an exhaust environment. More research is necessary in many areas, especially hydrocarbon and carbon monoxide oxidation by oxides and salts with promise of high thermal stability, and nitrogen oxide removal by base metals and their alloys. The report should be read in the context of newer information that will be released. Author (GRA)

N74-12016*# Xerox, Rochester, N.Y. REFURBISHMENT OF SOLAR SIMULATION OPTICAL TRAIN MIRROR ASSEMBLIES Final Report

W. R. Leverton Sep. 1973 29 p

(Contract NAS9-11461)

(NASA-CR-134123; EOS-1155) Avail: NTIS HC \$3.50 CSCL

Mirror refurbishment processing is described, and the results of processing 251 mirror assemblies are reported. The mirror replica bonding, optical tests, electrical discharge machining, and vacuum coating are discussed. F.O.S.

N74-12119*# Eason Oil Co., Oklahoma City, Okla. AN EVALUATION OF THE SUITABILITY OF ERTS DATA FOR THE PURPOSES OF PETROLEUM EXPLORATION Progress Report, Aug. - Sep. 1973

Robert J. Collins, Principal Investigator 28 Nov. 1973 6 p **ERTS**

(Contract NAS5-21735)

(E74-10029; NASA-CR-135870) Avail: NTIS HC \$3.00 CSCL ORG

There are no author-identified significant results in this report.

N74-12159# Bureau of Mines, Morgantown, W.Va. Energy Research Center.

DIRECTIONAL PROPERTIES OF COAL AND THEIR UTILIZATION IN UNDERGROUND GASIFICATION EXPERI-**MENTS Technical Progress Report**

C. A. Komar, W. K. Overbey, Jr., and J. Pasini, III Nov. 1973 14 p refs (BM-TPR-73) Avail: NTIS HC \$3.00

Renewed interest in the underground gasification of coal evolves from comprehensive studies of earth fracture systems that indicate that the movement of fluids can be controlled in the coalbed. In particular, directional property studies of natural microfissure occurrence, permeability, ultrasonic velocity, tensile strength, and orientation of intervals of inherent rock weakness together with geologic structure setting and fracture trace analysis. can predict the gaseous flow paths in the coalbed. Having this information, the dominant direction in which gases generated and/or liberated by heat can be determined so that appropriate well patterns can be developed. Together with advances made in drilling technology that permit long horizontal holes to be drilled through the coal seams, tests can be conducted to determine whether directional control will permit devolatilization of the coalbed low-Btu gas suited for the generation of electricity.

N74-12183# Southern Methodist Univ., Dallas, Tex. Geophysical

DEVELOPMENT OF GEOTHERMAL RESERVOIRS FROM OVER-PRESSURED AREAS BENEATH THE GULF COASTAL PLAIN OF TEXAS. A FEASIBILITY STUDY OF POWER PRODUCTION FROM OVERPRESSURED RESERVOIRS Final Report

Eugene Herrin Mar. 1973 149 p refs

(ARPA Order 2184)

(AD-766855; AFOSR-73-1344TR) Avail: NTIS CSCL 08/7 It is the purpose of the present study to determine the feasibility of locating a pilot project in the Texas Gulf Coast area for the purpose of tapping the overpressured aquifers and transforming the thermal and mechanical energy into electrical power. Three areas in south Texas were given particular attention for their feasibility of being the site of the pilot project. These are the Sebastian area in northwest Cameron County. the Port Mansfield area in eastern Willacy County, and the Corpus Christi area.

N74-12321# Kanner (Leo) Associates, Redwood City, Calif. PRESENT AIR POLLUTION SITUATION IN KAWASAKI CITY

AND FUTURE COUNTERMEASURES
Motoji Terabe Apr. 1973 22 p Transl. into ENGLISH from Kuki Seija (Tokyo) v. 10, no. 5, Oct. 1972 p 66-71 Spansored by Environ. Protection Agency

(KS-27; APTIC-47644) Avail: NTIS 11C \$3.25

The concentration of air pollutants and their effects are reported for Japan from 1965 through 1971. The present situation, in regards to sulfurous acid gas pollution, is discussed along with the future countermeasures. The air pollutants include: combustable products, leads, nitrogen oxides, ozones, organic peroxides, carbon monoxide, and hydrocarbons. The smoke producing facilities are listed along with the amounts of fuels used and the amounts of sulfurous gas acids produced. The occurrences of photochemical smog, dust fall, automobile gas exhausts, and the illnesses caused by these pollutants are also discussed.

N74-12445*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EMISSION CALCULATIONS FOR A SCRAMJET POWERED HYPERSONIC TRANSPORT

Erwin A. Lezberg Nov. 1973 32 p

(NASA-TM-X-71464; E-7760) Avail: NTIS HC \$3.75 CSCL

Calculations of exhaust emissions from a scramjet powered hypersonic transport burning hydrogen fuel were performed over a range of Mach numbers of 5 to 12 to provide input data for wake mixing calculations and forecasts of future levels of pollutants in the stratosphere. The calculations were performed utilizing a one-dimensional chemical kinetics computer program for the combustor and exhaust nozzle of a fixed geometry dual-mode scramjet engine. Inlet conditions to the combustor and engine size was based on a vehicle of 227,000 kg (500,000 lb) gross take of weight with engines sized for Mach 8 cruise. Nitric oxide emissions were very high for stoichiometric engine operation but for Mach 6 cruise at reduced equivalence ratio are in the range predicted for an advanced supersonic transport. Combustor

designs which utilize fuel staging and rapid expansion to minimize residence time at high combustion temperatures were found to be effective in preventing nitric oxide formation from reaching equilibrium concentrations. Author

N74-12447*# Owens-Illinois, Inc., Toledo, Ohio.
EXPLORATORY DEVELOPMENT OF A GLASS CERAMIC **AUTOMOBILE THERMAL REACTOR**

R. E. Gould and R. W. Petticrew Sep. 1973 33 p refs (Contract NAS3-14334)

(NASA-CR-134531) Avail: NTIS HC \$3.75 CSCL 21A

This report summarizes the design, fabrication and test results obtained for glass-ceramic (CER-VIT) automotive thermal reactors. Several reactor designs were evaluated using both enginedynamometer and vehicle road tests. A maximum reactor life of about 330 hours was achieved in engine-dynamometer tests with peak gas temperatures of about 1065 C (1950 F). Reactor failures were mechanically induced. No evidence of chemical degradation was observed. It was concluded that to be useful for longer times, the CER-VIT parts would require a mounting system that was an improvement over those tested in this program. A reactor employing such a system was designed and fabri-Author

N74-12448* # National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va. DESIGN CONSIDERATIONS FOR THE AIRFRAME-

INTEGRATED SCRAMJET

John R. Henry and Griffin Y. Anderson Washington Dec. 1973 38 p refs Presented at 1st Intern. Symp. on Air Breathing Engines, Marseille, France, Jun. 1972

(NASA-TM-X-2895; L-8152) Avail: NTIS HC \$3.00 CSCL 21E

Research programs at the NASA Langley Research Center on the development of airframe-integrated scramjet concepts (supersonic combustion ramiet) are reviewed briefly. The design and performance of a specific scramjet configuration are examined analytically by use of recently developed and substantiated techniques on boundary-layer development, heat transfer, fuel-air mixing, heat-release rates, and engine-cycle analysis. These studies indicate that the fixed-geometry scramjet module will provide practical levels of thrust performance with low cooling requirements. Areas which need particular emphasis in further development work are the combustor design for low speeds and the integrated nozzle design. Author

N74-12462*# Maryland Univ., College Park. Dept. of Mechanical Engineering.

AN ASSESSMENT OF SOLAR ENERGY AS A NATIONAL **ENERGY RESOURCE**

Dec. 1972 88 p. refs. Sponsored by NASA

(Grant NSF GI-32488)

(NASA-CR-136191; PB-221659; NSF/RA/N-73-001) Avail:

NTIS HC \$6.50 CSCL 03B

The findings of a panel on the development and application of solar energy to reduce the need for fossil fuels are presented. The applications which are considered most promising from technical, economic, and energy quantity standpoints are: (1) heating and cooling of residential and commercial buildings, (2) chemical and biological conversion of organic materials to figured, solid, and gaseous fuels, and (3) generation of electricity. Tables are presented to show the solar utilization techniques, major technical problems, and the impact of solar energy applications on the reference energy system.

N74-12577# Oak Ridge National Lab., Tenn. SECOND ITERATION ANALYSIS OF A FOSSIL FUEL-FIRED GAS TURBINE-POTASSIUM-STEAM COMBINED CYCLE M. E. Lackey Jul. 1973 32 p refs (Contract W-7405-eng-26)

(ORNL NSF EP-39) Avail: NTIS HC \$3.75

The operating conditions and heat balance of the fossil

fuel-fired potassium vapor topping cycle as proposed in an initial ORNL study carried out under the NSF-RANN program have been reexamined in considerable detail. It appears desirable to reduce the peak temperature in the steam system as well as make a number of modifications in the feed heating system. Gas turbine operating experience has been reviewed to provide a firm basis for choosing the turbine inlet temperature and component efficiency for the gas turbine cycle. On the basis of these analyses the operating conditions of the initial study were modified and a new flow sheet and heat balance were prepared using the supercritical pressure steam cycle of the TVA Bull Run steam plant as the point of departure. This gave an overall combined cycle efficiency of 52% and a net heat rate of 6580 Author (NSA) Btu/kW-hr.

N74-12635 Parente (Robert B.), Los Angeles, Calif. POWER SOURCE QUALITY Robert B. Parente In WESCON The 1973 WESCON Tech.

Papers, Vol. 17 1973 3 p 03-34)

Copyright.

The various source deficiencies which can occur in the quality of ac electric power serivce, their potential consequences upon the performance of electronic equipment, and their cures are surveyed. These deficiencies include blackouts, brownouts, and waveform distortion. The information is considered to have particular application in plant siting, operations, or the preparation of specifications for new electronic equipment.

N74-12636 Federal Aviation Administration, Washington, D.C. POWER CONDITIONING SYSTEM FOR FAA AIR ROUTE TRAFFIC CONTROL CENTERS

Anthony J. Froehlich and Alexander Kusko (Kusko (Alexander), Inc., Needham Heights, Mass.) In WESCON The 1973 WESCON Tech. Papers, Vol. 17 1973 4 p refs

Copyright.

The FAA is presently installing 18,000 kVA of solid state UPS equipment to supply power at high reliability to critical electronic loads at 20 air route traffic control centers (ARTCC's) in the U.S. The requirements for a power conditioning system for ARTCC's are given, and two approaches to meet these DIG requirements are discussed.

N74-12664 Pennsylvania Univ., Philadelphia. SOLAR HEAT UTILIZATION IN RESIDENTIAL HEATING SYSTEMS Ph.D. Thesis

Abdullah Ostad-Hosseini 1972 216 p Avail: Univ. Microfilms Order No. 73-13447

A performance model of a solar collector was created in order to determine the useful heat which may be obtained from a flat plate solar collector. The model permits the calculation of the efficiency of a flat plate solar collector as a function of interplate spacing, incident solar radiation, number of plates, emissivity and absorptivity of the absorber, angle of incidence and other engineering variables. The model was used to compare different collector designs. The results are presented in graphical form suitable for system performance determination. A series of experiments yielded results within 5% of the analytical predictions. The computer program can predict the efficiency of solar collector as a function of date, time, location, and orientation of the collectors, the thermal and optical properties of glass and absorber plates, and the temperatures of the outside glass plate and the absorber plate. Weather data can be fed into the computer along with this program to obtain the yearly yield of solar heat.

Dissert, Abstr.

N74-12668# Committee on Science and Astronautics (U. S. Housel

UNIVERSITY ENERGY RESEARCH CENTERS

Washington GPO 1973 52 p refs. Hearing on H.R. 8348 and H.R. 9133 before Comm. on Sci. and Astronaut., 93d Congr. 1st Sess., No. 11, 23 Jul. 1973

Avail: NTIS Avail Subcomm. on Energy

A Congressional hearing is presented concerning the enactment of bills for enlisting the aid of academic researchers in carrying out energy R and D programs. Previous bills and past efforts are cited. The relationship between national laboratories to universities and the relation of either or both to private industry and the Federal Government, and to mission oriented projects associated with power engineering research are discussed. The designation of certain leading institutions and universities in certain fields is also considered. T.M.R.

N74-12669# Boeing Commercial Airplane Co., Seattle, Wash. WHERE ARE WE HEADED IN AIR TRANSPORT?
L. T. Goodmanson 17 Oct. 1973 19 p Presented at Airport Operators Council Intern. Ann. Conf., Dallas, 17 Oct. 1973

Certain trends are indicated for the future of air transport and a discussion on both cargo and passenger aircraft design options are given. An example from today's fleet of passenger airplanes is used to illustrate design improvement possibilities for current aircraft. This is followed by a discussion of new airplanes for both the near and far term. The passenger aircraft section includes a discussion on terminal area compatibility. The future cargo aircraft section covers a broad spectrum of designs, from conventional types of air freighters to new, dedicated intermodal systems. Some long range thinking about energy conservation and its effect on aircraft design is included. Author

N74-12672# Committee on Science and Astronautics (U. S. House)

ENERGY FACTS

Avail, NTIS HC \$3.00

Washington GPO Nov. 1973 458 p refs Presented to Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 29 Nov. 1973 Prepared by Library of Congr. Avail: Subcomm. on Energy

A congressional report on United States and foreign energy statistics is presented. Tables on the most common and some unconventional energy sources are developed. The statistical tables and graphs are grouped by resources, production, consumption and demand, energy and gross national products, and research and development. An inventory of world wide nonrenewable energy sources in the forms of natural gas, natural gas liquids, crude oil, shale oil, and coal is developed.

N74-12674*# Auburn Univ., Ala. School of Engineering.
TERRASTAR: TERRESTRIAL APPLICATION OF SOLAR
TECHNOLOGY AND RESEARCH Final Report
Sep. 1973 344 p refs

(Contract NGT-01-003-044)

(NASA-CR-129012) Avail: NTIS HC \$19.25 CSCL 05A

The application of solar energy to the energy crisis of the 70's and beyond is discussed in the context of energy consumption in the U.S., energy resources in the U.S., and the state-of-the-art of solar energy applications. Solar energy application concepts, such as solar farms (a term used to describe vast fields of concentrators collecting solar energy for the generation of steam to drive power turbines), an orbiting solar power station. and the conversion of solar energy into solar power for heating and cooling of individual buildings on the earth, are discussed. The report emphasizes the application of solar energy to the heating and cooling of buildings since this application seems to be more promising in the near term as far as research and development are concerned. The importance of initiating research and development on all solar application concepts is stressed as an important step in pursuing the use of solar energy. Immediate steps leading to the application of solar energy to heating and cooling of buildings are outlined to insure appreciable energy displacement through the use of solar energy by the year 2020.

N74-12676* Auburn Univ., Ala.
ENERGY CONSUMPTION: PAST, PRESENT, FUTURE
In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res.

Sep. 1973 27 p refs

The energy consumption history of the United States and the changes which could occur in consumption characteristics in the next 50 years are presented. The various sources of energy are analyzed to show the limitations involved in development and utilization as a function of time available. Several scenarios were prepared to show the consumption and supply of energy under varying conditions.

Author

N74-12676* Auburn Univ., Ala. ENERGY AND RESOURCE CONSUMPTION

In its TERRASTAR: Terrest, Appl. of Solar Technol, and Res. Sep. 1973 10 p. refs

The present and projected energy requirements for the United States are discussed. The energy consumption and demand sectors are divided into the categories: residential and commercial, transportation, and industrial and electrical generation (utilities). All sectors except electrical generation use varying amounts of fossile fuel resources for non-energy purposes. The highest percentage of non-energy use by sector is industrial with 71.3 percent. The household and commercial sector uses 28.4 percent, and transportation about 0.3 percent. Graphs are developed to project fossil fuel demands for non-energy purposes and the percentage of the total fossil fuel used for non-energy needs.

Author

N74-12677* Auburn Univ., Ala. ENERGY RESOURCES

In its TERRASTAR: Terrest, Appl. of Solar Technol, and Res. Sep. 1973–34 p. refs CSCL 20M

A statistical analysis of the availability of fossil fuels for energy and non-energy production is presented. The cumulative requirements for petroleum, natural gas, and coal are discussed. Alternate forms of energy are described and the advantages and limitations are analyzed. Emphasis is placed on solar energy availability and methods for conversion. The Federal energy research and development funding for energy sources is tabulated.

N74-12678* Auburn Univ., Ala. COMPONENTS FOR SOLAR ENERGY

In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res. Sep. 1973 14 p refs CSCL 20M

A requirement for the direct technological utilization of solar energy is a device for capturing and absorbing the available sunlight. These devices are commonly termed collectors. Because of the highly variable nature of sunlight, a facility for storing the collected energy is often essential. A device for direct conversion of light into electricity, which depends for operation on incident sunlight, is the photovoltaic cell. These components for solar energy systems are considered.

N74-12679* Auburn Univ., Ala. SOLAR HEATING AND COOLING BUILDINGS

In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res. Sep. 1973 28 p refs CSCL 20M

Sunshine is available in differing amounts everywhere in the world and the easiest method of capturing it is by absorption in the form of thermal energy (heat). Therefore, it is logical to utilize it directly in the heating and cooling of buildings and avoid losses that would occur by conversion to some other form. It may be emphasized that of the total energy consumed annually in the U.S., about 25% is used for heating and cooling in buildings. It is generally agreed that of all the possible widespread uses of solar energy, this application has the highest probability of success in the near term. Although there are significant uncertainties associated with some technological and economic aspects, they do not loom as large as those associated with

other potentially significant applications, such as electrical power generation. It may, however, be noted that solar electrical power generation at the building site, or at a centralized station is an excellent long term prospect. Approximately 25 experimental solar heated structures have been built in various parts of the world.

N74-12680* Auburn Univ., Ala.

SOLAR POWER GENERATION AND DISTRIBUTION

In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res. Sep. 1973 11 p refs CSCL 20M

The production of electricity from solar energy is discussed. The economics of the proposed generation and distribution systems are analyzed. The use of photovoltaics for converting solar energy to home heating is proposed. The problems of energy distribution are analyzed from the standpoint of equipment costs and complexity.

N74-12681* Auburn Univ., Ala. NATIONAL ENERGY POLICY

In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res. Sep. 1973 12 p refs CSCL 05A

The efforts of the U.S. government to cope with the national energy crisis are discussed. The provisions of several legislative actions to implement the actions for energy conservation are examined. Immediate conservation measures and the long range planning for energy resources are reported. Author

N74-12682* Aubum Univ., Ala. SOLAR ENERGY POTENTIAL

In its TERRASTAR: Terrest. Appl. of Solar Technol. and Res. Sep. 1973 9 P ref CSCL 20M

The potential of solar energy as a national resource is discussed. Research and development programs for the development of eleven concepts are described to show the proposed funding for each year over a fifteen year period. The estimated energy contributions by period for each of the solar concepts are analyzed. The estimated impact of the solar concepts to the year 2020 are tabulated. Author

N74-12683* Auburn Univ., Ala.

IMPACTS OF SOLAR ENERGY UTILIZATION

In its TERRASTAR: Terrest, Appl. of Solar Technol, and Res. Sep. 1973 25 p refs CSCL 20M

Various methods of conducting surveys and analyses to determine the attitude of the public toward the energy crisis are discussed. Models to determine the impact of the energy crisis and proposed alternative sources of energy on the social structure are analyzed. The various interest groups which are concerned with energy and the nature of their interest are identified. The government structure for controlling resource production and allocation is defined.

N74-12684* Auburn Univ., Ala.

MARKET POTENTIAL FOR SOLAR HEATING AND COOLING IN BUILDINGS

In its TERRASTAR: Terrest, Appl. of Solar Technol, and Res. Sep. 1973 13 p refs CSCL 20M

The use of solar heating and cooling for buildings as a method of conserving fossil fuels is discussed. The residential and commercial end use consumption of energy is tabulated. A survey to project the energy requirements for home and industry heating and cooling is developed. The survey indicates that there is a market potential for solar heating and cooling of buildings.

A prediction of three to five billion dollars per year as the potential for solar heating and cooling is made.

N74-12685* Auburn Univ., Ala. STRATEGY FOR SOLAR HEATING AND COOLING IN **BUILDINGS**

In its TERRASTAR: Terrest, Appl. of Solar Technol, and Res. Sep. 1973 159 p refs CSCL 20M

The types of solar energy heating and cooling equipment for use with buildings are discussed. The steps from manufacturing to equipment installation are identified. A feasibility study for the use of solar energy was conducted. The study determined the technical, environmental, economic, sociological, political, and strategic aspects of solar heating and cooling.

N74-12687# Committee on Science and Astronautics (U. S.

THE FEDERAL GOVERNMENT AND ENERGY: R AND D HISTORICAL BACKGROUND

Washington GPO Mar. 1973 111 p refs Presented to Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., 20 Mar. 1973 Prepared by Library of Congr.

Avail: Subcomm. on Energy

Energy source R and D is traced for the Navy, the National Bureau of Standards, Federal Power Commission, Tennessee Valley Authority, Atomic Energy Commission, National Science Foundation, National Aeronautics and Space Administration, and Advisory boards and committees. A historical look at aviation technology is given along with research in the Dept. of Interior including geological surveys for the Bureau of Mines, and Offices of Oil, Gas, and Coal.

N74-12688# Committee on Science and Astronautics (U. S. House).

AN INVENTORY OF ENERGY RESEARCH, VOLUME 1

Washington GPO Mar. 1972 1111 p refs Presented to Comm. on Sci. and Astronaut., 92d Congr., 2d Sess., 20 Feb. 1972 Prepared by ORNL for Task Force on Energy Sponsored by NSF 2 Vol.

Avail: Subcomm. on Sci., Res., and Develop.

An inventory of energy research was prepared for the subcommittee on science, research, and development of the U.S. House of Representatives. An overview of the research being conducted on most aspects of energy production and use is provided. The survey was prompted by the concern for the limitation in the sources of energy and the impact of the production and use of energy on the environment. Within fourteen categories of energy sources 4,400 research projects have been

N74-12689# Committee on Science and Astronautics (U. S. Housel

AN INVENTORY OF ENERGY RESEARCH, VOLUME 2

Washington GPO Mar. 1972 631 p refs Presented to Comm. on Sci. and Astronaut., 92d Congr., 2d Sess., 20 Feb. 1972 Prepared by ORNL for Task Force on Energy Sponsored by NSF 2 Vol.

Avail: Subcomm. on Sci., Res., and Develop.

A permuted index of research projects involving energy sources was prepared for the subcommittee on science, research, and development of the U.S. House of Representatives. The index identifies fourteen categories of energy sources and 4.400 research projects within the categories. Author

N74-12690# Committee on Science and Astronautics (U. S.

SHORT TERM ENERGY SHORTAGES

Washington GPO 1973 927 p refs Hearings before Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 7, 3, 8, and 17 May 1973

Avail: Subcomm. on Energy

The hearings are reported concerning the causes and implications of the impending shortages of gasoline, heating oil, fuel oil, jet fuel, and electricity. Short term fuel shortages and their effects on electric utilities are analyzed. Other topics discussed include: natural gas supply, electric energy supply; R and D considerations, and convertibility of oil-fired electric utility plants to coal.

Author

N74-12691# Committee on Science and Astronautics (U. S.

ENERGY RESEARCH AND DEVELOPMENT AND SPACE TECHNOLOGY

Washington GPO 1973 573 p refs Hearings before Subcomm. on Space Sci. and Appl. and Subcomm. on Energy of the Comm. on Sci. and Astronaut. 93d Congr., 1st Sess., No. 9, 7, 22, and 24 May 1973

Avail: Comm. on Sci. and Astronaut.

The hearings concerning the energy R and D for developing long-term fuel supplies are reported. Topics discussed include: role of the Federal Laboratories in energy R and D; energy crisis and consumer costs, university programs, nuclear energy. and the relay of energy from power satellites by microwave FOS

N74-12693# Joint Publications Research Service, Arlington,

MATHEMATICAL METHODS OF OPTIMAL PLANNING DEVELOPMENT AND USE OF ENERGY SYSTEMS

L. P. Padalko 15 Nov. 1973 209 p. refs Transl, into ENGLISH of the book "Matematicheskive Metody Optimal nogo Planirovaniya Razvitiya i Ekspluatatsii Energosistem" Minsk, Izdatel' styo Vysheyshaya Shkola, 1973 199 p (JPRS-60546) Avail: NTIS HC \$12.50

A discussion is given of the bases of mathematical methods of optimal planning and their use for selecting optical solutions in the planning, development, and operation of power supply eveteme Author

N74-12695# Oak Ridge National Lab., Tenn. ENERGY RESEARCH AND DEVELOPMENT: A SELECTED READING LIST

M. P. Guthrie, ed., E. E. Huber, ed., and G. A. Norwood, ed. (AEC, Washington, D. C.) Nov. 1973 107 p Revised (Contract W-7405-eng-26; NSF-IA-AAA-R-479) (ORNL-EIS-73-65-Rev-1) Avail: NTIS HC \$7.50

A selected list of readings designed to aid policymakers in the identification of promising areas for energy research and development is presented. The document is also designed to assist the informed layman who wishes to orient himself in this overall field. The genesis of the reading list was a need to gain a perspective on what has already been done in energy research and development. This perspective was required to support the development of a report to the President from the Chairman of the Atomic Energy Commission on long-range energy research and development needs and policy as requested in the President's June 29, 1973, statement on Energy and National Resources. A basic aim was to include monographs and reports on technology assessment for each of the many energy technologies. The bibliography emphasizes general publications on energy sources. electric power, generation, and energy uses. Detailed technical reports and scientific papers are included only to a limited extent. A special effort was made to include Congressional publications relating to energy. Author

N74-12696# Los Alamos Scientific Lab., N.Mex. SOME INTERFACES IN RESOURCE UTILIZATION

L. P. Reinig [1973] 16 p refs Presented at Symp. on Econ. Develop, vs. Environ, Quality in the Southwest, Lubbock, Tex., 19-20 Apr. 1973; sponsored by Comm. on Desert and Arid Zone Res. of the Am. Assoc. For the Advan. of Sci. (Contract W-7405-eng-36)

(LA-UR-73-570; Conf-730440-1) Avail: NTIS HC \$3.00

Los Alamos Scientific Laboratory is engaged in programs to explore the ways of extracting useful power from the heat of the earth's crust; to demonstrate the feasibility of superconducting transmission lines; and to develop a rock-melting penetrator, or subterrene, expected to be capable of creating long tunnels in rock. The tunnels, lined with the glass-like melted rock created by passage of the subterrene, might form excellent conduits for underground transmission lines, as well as serving in the exploitation of geothermal energy. A project to exploit the vast

underground reservoir of saline water in New Mexico is described. The project TRG is based on desalination by means of geothermal or nuclear energy to furnish New Mexico with water and electric nower

N74-12742# Pratt and Whitney Aircraft, East Hartford, Conn. AIR MOBILITY FUEL CELL STUDY Technical Report, 9 May 1972 - 9 Jan. 1973

Jeffrey H. Arnold Kirtland AFB, N. Mex. AFWL Jul. 1973 96 p refs

(Contract F29601-72-C-0083; AF Proj. 683M)

AD-766757; PWA-4635; AFWL-TR-73-26) Avail: NTIS CSCI 10/2

An analytical and test program was conducted to evaluate the fuel cell power concept for the Bere Base mission which was selected as an example of an air mobility application, A life cycle cost model was developed and the life cycle costs of candidate fuel cell power systems were compared to the present Bare Base centralized power system. A study and test program was conducted to determine the feasibility of desulfurizing military JP-4 fuel and a powerplant test program was also conducted to evaluate operation on JP-4 fuel to meet typical air mobility loads. Study results verified that dispersed fuel cell power systems offer potential operational advantages in system installation, operation, and maintenance and are economically competitive with existing centralized power systems. The desulfurizer test program demonstrated the feasibility of desulfurizing JP-4 fuel. Powerplant tests demonstrated the capability to operate on JP-4 fuel and the ability to provide power compatible with air mobility loads. A comprehensive field experiment was planned as a logical next step to confirm the economic and operational conclusions of the study and provided detailed design information for an air mobility fuel cell system. Author (GRA)

N74-12744# Pratt and Whitney Aircraft, East Hartford, Conn. THE 1.6-kW FUEL CELL POWERPLANT Final Report, 1 Jul. 1971 - 31 Dec. 1972

Anthony J. DeCaspens and H. Leigh Ferguson 2 Apr. 1973 119 p refs

(DA Proj. 1G6-63702-DG-10; Contract DAAK02-70-C-0518) (AD-767302; PWA-4704) Avail: NTIS CSCL 10/2

Four advanced development model 1.5kW fuel cell power plants were delivered to the Army for evaluation. The delivery configuration power plant weighs 292 lbs. and has a volume of 9.7 cubic feet. Startup and Operation are fully automatic and the power plant operates on JP-4 fuel with a specific fuel consumption of less than 2.2 lbs/kWh. Output voltage is adjustable from 26 to 34 volts at any output from 0 to 1.5kW. The power plant consists of four subsystems, a regenerative thermal cracker, which converts logistic fuel to hydrogen, an acid fuel cell power section which generates dc power from hydrogen and air, a voltage regulator and an automatic control system. A core technology program was conducted to develop the cracker voltage regulator and automatic control unit. Limited development of the power section, which is based on commercial technology fuel cells, to tailor the design to Army requirements was also conducted. The program culminated with development testing of a complete power plant and delivery of four power plants to the Army. Author (GRA)

N74-12824# Research Inst. of National Defence, Sundbyberg

COMBUSTION OF THE GASES METHANE, LP GAS AND AMMONIA IN A MIXING REACTOR [FOERBRAENNING AV GASERNA METAN, GASOL OCH AMMONIAK I EN FOERBLANDAD REAKTOR]

Henry Kanebaeck and Ivar Lill Mar. 1972 31 p In SWEDISH (FOA-1-C-1442-H3) Avail: NTIS HC \$3.75

The burning of sulfurous compounds in a test reactor for removing contaminents in the air is considered. The reactor is a flow tube with a stage for mixing, and combustion is obtained without catalysts at as high a temperature as possible. Previous

good results using sulfurous compounds have been verified with LP gas and ammonia whilst as expected, methane is needed for difficult reactions. From the point of view of preserving the environment it is also interesting to see whether, in addition to questions of the economics of heating, selective combustion in mixtures of ammonia and sulfurous compounds, e.g. H2S and RSH, are acceptable.

Author.

N74-13051*# Alabama Univ., University. Bureau of Engineering

INVESTIGATIONS USING DATA IN ALABAMA FROM ERTS-A Birmonthly Progress Report, 7 Oct. - 6 Dec. 1973 Harold R. Henry and George P. Whittle, Principal Investigators 6 Dec. 1973 66 p ref ERTS (Contract NASS-21876)

(E74-10124: NASA-CR-136169; BMPR-7) Avail: NTIS HC \$5.50 CSCL 08B

There are no author-identified significant results in this report.

N74-13428# Joint Publications Research Service, Arlington, Va.

FROM SCIENTIFIC RESEARCH TO THE ATOMIC IN-

A. M. Petrosyants 19 Nov. 1973 222 p refs Transl. into ENGLISH from the book "Ot Nauchnogo Poiska k Atomnoy Promyshlennosti" Moscow, Atomizdat, 1972 231 p (JPRS-60584) Avail NTIS HC \$13.25

Excerpts from a book tracing the evolution of the nuclear power industry from the research stage to its present day development are presented. Topics discussed include high-energy physics, thermonuclear fusion, electric power engineering, small and low power nuclear power plants, prospects of nuclear power engineering, radioactive waste disposal, and nuclear centers.

Author

N74-13466*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

LIQUID METAL MAGNETOHYDRODYNAMICS (LMMHD) TECHNOLOGY TRANSFER FEASIBILITY STUDY. VOLUME 1: SUMMARY

R. L. Phen, Lance G. Hays, and M. E. Alper 18 May 1973 60 p. Soonsored by NASA 2 Vol.

(NASA-CR-136197; JPL-1200-59-Vol-1) Avail. NTIS HC

The potential application of liquid metal magnetohydrodynamics (LMMHD) to central station utility power generation through the period to 1990 is examined. Included are: (1) a description of LMMHD and a review of its development status, (2) LMMHD preliminary design for application to central station utility power generation, (3) evaluation of LMMHD in comparison with conventional and other advanced power generation systems and (4) a technology development plan. One of the major conclusions found is that the most economic and technically feasible application of LMMHD is a topping cycle to a steam plant, taking advantage of high temperatures available but not usable by the steam cycle.

N74-13467*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

LIQUID METAL MAGNETOHYDRODYNAMICS (LMMHD) TECHNOLOGY TRANSFER FEASIBILITY STUDY. VOLUME 2: APPENDIXES

R. L. Phen, Lance G. Hays, and M. E. Alper 18 May 1973 198 p refs Sponsored by NASA 2 Vol.

(NA SA-CR-136198; JPL-1200-59-Vol-2) Avail: NTIS HC \$12.00 CSCL 20I

The potential application of liquid metal magnetohydrodynamics (LMMHD) to central station utility power generation through the period to 1990 is examined. Included are: (1) a description of LMMHD and a review of its development status, (2) LMMHD preliminary design for application to central station utility power generation, (3) evaluation of LMMHD in comparison with conventional and other advanced power generation systems and (4) a technology development plan. One of the major conclusions found is that the most economic and technically feasible application of LMMHD is a topping cycle to a steam plant, taking advantage of high temperatures available but not usable by the steam cycle.

N74-13537# California Univ., Livermore. Lawrence Livermore

SOLAR PONDS EXTENDED

A. F. Clark 27 Jul. 1973 12 p refs (Contract W-7405-eng-48)

(UCID-16317) Avail: NTIS HC \$3.00

An effort was made to find and develop a system to produce electrical power from solar energy. The largest item of cost in a solar energy system is the collector, and a solar pond can be made very cheaply compared to mirrors or metal collection or multilayered glass systems. The heat can be transported by, stored in, and extracted from water very readily and relatively inexpensively. The present concepts feature a shallow pond that is quickly and readily heated and can be emptied at night, cutting down on the thermal losses. The pond would be filled only when the solar radiation is strong enough to heat the water. The rest of the time the water would be stored in a large insulated reservior, thus providing as much heat energy storage as desired and certainly enough to last more than a day or so. Calculations indicate that a thermodynamic cycle using some fluid other than water could be more efficient in extracting power. A Freon 11 figuid-vapor system could be the appropriate fluid to run the turbine and generate electricity. Waste heat could be disposed of in a water cooling tower.

N74-13538# California Univ., Berkeley, Lawrence Berkeley Lab.

CALCULATIONS ON A SOLAR ENERGY SYSTEM

R. M. Graven 8 Mar. 1973 33 p refs Presented at the Intern. Meeting on the Solar Energy Soc., Cleveland, 3 Oct. 1973

(Contract W-7405-eng-48)

(LBL-1773; Conf-731002-1) Avail: NTIS HC \$3.75

A computer program has been used to calculate the amount of energy which can be extracted from a flat plate solar collector. The computations consider latitude, heat loss, daily temperature range, percent cloud cover, sun angle, etc. to determine the feasibility of home heating for an angularly adjustable solar collector in the Northern Hemisphere. The program also calculates the energy available from a solar-earth heat pump. The influence of design parameters and the feasibility of using solar energy to generate heat and electricity for a small single family residence have been considered.

Author (NSA)

N74-13673# National Research Council of Canada, Ottawa (Ontario).

QUARTERLY BULLETIN OF THE DIVISION OF MECHANI-CAL ENGINEERING AND THE NATIONAL AERONAUTICAL ESTABLISHMENT, 1 JULY - 30 SEPTEMBER 1973

30 Sep. 1973 82 p refs

(DME/NAE-1973(3)) Avail: NTIS HC \$6.25

A review of current activities of Canadian mechanical angineering and national aeronautical establishments is presented. The topics discussed are: (1) effects of Reynolds number at low speeds on the maximum lift of two dimensional aerofoil sections equipped with mechanical high lift devices; (2) energy in transportation; and (3) a wave buoy accelerometer unit. A list of current projects and publications is included.

N74-13675 National Research Council of Canada, Ottawa (Ontario). Engine Lab.
ENERGY IN TRANSPORTATION

E. P. Cockshutt In its Quart. Bull. of the Div. of Mech. Eng. and the Natl. Aeron. Estab. 30 Sep. 1973 p. 25-32 refs

The energy requirements of a variety of transportation systems are reviewed in the context of the current concern over diminishing reserves of hydrocarbon fuels. The energy costs of current passenger and cargo transportation systems are presented. The energy cost components - thermo-propulsive efficiency, frictional resistance, and structural efficiency-are assembled as a ratio for low energy cost. Charts and graphs are included.

K.M.M.

N74-13697# Stanford Research Inst., Arlington, Va. Strategic Studies Center.

LEGAL CONSIDERATIONS AND CONSTRAINTS ON US NUCLEAR POLICY Final Report

Albert Ferri, Jr. Dec. 1972 48 p refs

(Contract DAHC19-71-C-0001; SRI Proj. 8974)

(AD-754641; SSC-TN-8974-68) Avail: NTIS CSCL 05/4

A review of the major pre-SALT treaties and laws affecting U.S. nuclear policy is reported. The major items of the paper are presented mainly in chronological order. The last section of the work discusses recent trends in U. S. domestic law and their significance for U. S. nuclear policy. This research is part of a larger effort which utilizes this material in force posture analysis. This compilation is considered a handy and useful summary of constraints on nuclear policy which may have wider utility for other elements of the defense establishment. This research paper does not cover the SALTIABM Treaty nor the interim agreements on the limitation of strategic offensive weapons.

N74-12759 McGill Univ., Montreal (Quebec).

THE EFFECT OF FRONTAL EYE FIELD STIMULATION OF UNIT RESPONSES IN THE SUPERIOR COLLICULUS OF THE CAT

D. Guitton and G. Mandl In its DRB Aviation Med. Res. Unit Rept. Vol. 3, 1971 - 1973 Oct. 1973 p 124-131 refs Submitted for publication (AMRU-R 73-7)

Effects of excited units in the frontal eye field on visually evoked responses of movement sensitive cells in the superior colliculus of the cat are studied. Results show that units unresponsive to visual stimulation can be influenced at short latency by frontal eye field stimulation; they are located 2-3 mm below the superior colliculus surface. Units that respond to both visual and electrical front field stimulation are generally situated more superficially. The influence of electrical front field stimulation on visual responses depends on the relative timing between the two modes of stimulation. It is concluded that a neural discharge originating in the frontal eye field and arriving at the superior colliculus after an eye movement, cannot operate as a corollary discharge.

N74-12766 McGill Univ., Montreal (Quebec). DO MUSCLE AFFERENTS CONTRIBUTE TO LONG-LOOP REFLEXES IN MAN?

C. W. Y. Chan, G. Melvill Jones, and R. F. H. Catchlove In its DRB Aviation Med. Res. Unit Rept., Vol. 3, 1971 - 1973 Oct. 1973 p 223-231 refs (AMRU-R.73:5)

Muscular response to stretch has been termed the Functional Stretch Reflex (FSR). Experiments were undertaken to investigate the relative contributions of muscle and other afferents to the FSR. In each of ten subjects, complete anesthesia of the ankle and foot was obtained by intravenous regional anesthesia. The MSR to a sharp tap on the Achilles' tendon and the FSR to a suddenly applied and mainteined dorsiflexing force to the sole of the foot were recorded by surface emg from the gastrocnemius before, during and after full recovery from regional anesthesia. The results showed no significant change in mean latency of the MSR; the respective mean latencies of the FSR were indistinguishable from one another, as were their response amplitudes. It is therefore concluded that the observed

FSR probably originated predominantly from muscle afferents. In conjunction with other current results, it is inferred that these muscle afferent signals mediate their influence at least in part through long loop central pathways.

N74-14028*# Wolf Research and Development Corp., Pocomoke City, Md

APPLICABILITY OF SKYLAB REMOTE SENSING FOR DETECTION AND MONITORING OF SURFACE MINING ACTIVITIES Quarterly Progress Report, 8 Sep. - 31 Dec. 1973

R. L. Brooks, Principal Investigator and J. D. Pennewell 28 Dec. 1973 6 p. EREP

(Contract NAS9-13310)

(E74-10160; NASA-CR-136287; QPR-3) Avail: NTIS HC \$3.00 CSCL 08I

There are no author-identified significant results in this report.

N74-14093*# Kansas Univ. Center for Research, Inc., Law-

RESEARCH ON THE APPLICATION OF SATELLITE REMOTE SENSING TO LOCAL, STATE, REGIONAL, AND NATIONAL PROGRAMS INVOLVED WITH RESOURCE MANAGEMENT AND ENVIRONMENTAL QUALITY Semiannual Progress Report, Apr. Sep. 1973

Robert L. Walters, Robert J. Eastmond, and B. G. Barr Sep. 1973 69 p. refs

(Grant NGL-17-004-024)

(NASA-CR-136472) Avail: NTIS HC \$5.50 CSCL 08F

Project summaries and project reports are presented in the area of satellite remote sensing as applied to local, regional, and national environmental programs. Projects reports include: (1) Douglas County applications program: (2) vegetation damage and heavy metal concentration in new lead belt; (3) evaluating reclamation of strip-mined land; (4) remote sensing applied to land use planning at Clinton Reservoir: and (5) detailed land use mapping in Kansas City, Kansas.

K.M.M.

N74-14094# Citizens Advisory Committee on Environmental Quality, Washington, D.C.

REPORT TO THE PRESIDENT AND TO THE COUNCIL ON ENVIRONMENTAL QUALITY

Oct. 1973 48 p refs Avail: SOD HC \$1.05

A report on the effectiveness of environmental protection methods is presented. The report was prepared for the President by the Citizens' Advisory Committee on Environmental Quality. The subjects discussed include: (1) actions taken to improve waste disposal. (2) land use action legislation. (3) environmental impact statements. (4) protection of agricultural lands, (5) center city improvement efforts, (6) urban transportation systems, (7) preservation of historic features, and (8) energy conservation measures.

N74-14097# Sydney Univ. (Australia). Dept. of Mechanical Engineering.

ALTERNATIVE ENERGY SOURCES: A RESEARCH Challenge

D. W. George 1973 21 p refs Presented at Symp. on the Energy Crisis: Implications for Secondary Ind., Sydney, 23 May 1973

(Conf-730560-1) Avail: AEC Depository Libraries HC \$3.25

Methods of obtaining energy such as controlled thermonuclear fusion, direct solar conversion, or deep geothermal resources of energy are considered alternative energy sources in a global sense. In Australia, nuclear fission and natural gas are considered alternative or unconventional energy sources. One significant area of alternative energy source discussed is the energy currently dissipated to the environment in a nonproductive manner through the limitations of conventional conversion technology and which in overall terms often exceeds that actually used by a factor of two or three. Research into improved methods

of conversion includes areas such as MHD power generation and fuel cells. It also includes the concept of total industrial energy. Other alternative energy sources discussed include the natural sources of primary energy, namely, solar energy, tidal energy, wind, and geothermal energy.

N74-14105# Tennessee Univ., Knoxville. Water Resources Research Center

STRIP-MINED WATERSHED HYDROLOGIC DATA ACQUI-SITION STUDY

Bruce A. Tschantz 27 Aug. 1973 24 p refs (Contract Di-14-31-0001-3843)

(PB-223558/8GA: OWRR-A-030-TENN(1); W73-14368;

RR-35) Avail: NTIS HC \$2.75 CSCL 08H

Remotely sensed aerial photography of two small strip mined East Tennessee watersheds was used as a means for obtaining land use information essential to econometric and hydrologic studies and for reclamation practice surveillance. 1:12,000 scale maps were produced for both watersheds from three color IR photographic flights. Other available high altitude photography and thermal imagery data were used to help map strip mine disturbed areas. The study demonstrated the usefulness of using low altitude IR photography for identifying, mapping, and measuring strip mine disturbance areas. (Modified author abstract)

N74-14251# National Commission on Materials Policy, Washington, D.C.

COMPENDIUM OF UNIVERSITY FORUMS OF THE NATIONAL COMMISSION ON MATERIALS POLICY, MAY -JUNE 1972, A BACKGROUND DOCUMENT, NCMP FORUM ON TECHNOLOGICAL INNOVATION IN THE PRODUCTION AND UTILIZATION OF MATERIALS AT PENNSYLVANIA STATE UNIVERSITY, ON 19-21 JUNE 1972

Allen F. Agnew Aug. 1973 223 p refs (PB-223679/2GA; NCMP-UF-6) Avail: NTIS HC \$13.25 CSCL 050

The Pennsylvania State University Forum discussed, under the general thrust of technological innovation, iron and steel. nonferrous production metallurgy, economics of substitution, polymeric and ceramic materials, coal and synthetic pipeline gas, and the state of the U.S. mineral position.

N74-14377# Oak Ridge National Lab., Tenn. ISOTOPE KILOWATT PROGRAM Quarterly Progress Report, period ending 31 Mar. 1973

A. P. Fraas and G. Samuels Sep. 1973 28 p refs (Contract W-7405-eng-26)

(ORNL-TM-4243) Avail: NTIS HC \$3.50

Work in progress on developing a 1 to 10 kW radioisotopefueled energy conversion system for terrestrial and undersea use is described. Information is included on: facilities for decomposition testing of materials being evaluated as a working fluid for an organic Rankine cycle conversion system; decomposition test results which indicated that the gas volume evolved in capsules loaded with Dowtherm A was much higher than for capsules containing material produced by the Eastman Kodak Co.; performance testing of fusible insulation; and thermal and impact testing of fuel capsules.

N74-14408# Office of Naval Research, London (England). MHD FOR POWER GENERATION: THE VIEW OF A CHOSEN FEW

David F. Dver 20 Apr. 1973 11 p

(AD-760342; ONRL-C-10-73) Avail: NTIS CSCL 20/9

A report of the ninth meeting of the international liaison group on magnetohydrodynamics power generation and the MHD closed cycle specialist meeting held in Geneva is given. The following topics are discussed various concepts proposed for MHD power generation the role of programs in various countries technology problems to be overcome in producing viable MHD power generation systems meetings and publications concerned with MHD for power generation.

N74-14496*# National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala.

SOLAR ENERGY POWER SYSTEM Patent Application

Billy K. Davis, inventor (to NASA) Filed 4 Dec. 1973 18 p (NASA-Case-MFS-21628-1; US-Patent-Appl-SN-421702) Avail: NTIS HC \$3.00 CSCL 20M

A solar energy vapor (freon) powered system is described for generating electrical energy in which a portion of the heat absorbed from the sun in daylight is stored for use during darkness by a thermal capacitor. A mass of Pyrone, having a high thermal capacity, liquifies when heat is applied to it and goes through a solidification process to provide a heat output. A highly efficient solar boiler is constructed, utilizing an anodized titanium surface and a particular combination of shaped boiler tubes and complementary reflectors. The overall efficiency of the system is further improved by an arrangement of heat recovery devices.

NASA

N74-14499# Maryland Univ., College Park, Dept. of Mechanical **Engineering**

PROCEEDINGS OF THE SOLAR HEATING AND COOLING FOR BUILDINGS WORKSHOP. PART 1: TECHNICAL SESSIONS, MARCH 21 AND 22

Redfield Allen Jul. 1973 231 p refs Workshop held Washington, D. C., 21-23 Mar. 1973

(Grant NSF GI-32488)

(PB-223536/4GA: NSF-RA/N-73-004) Avail: NTIS HC \$3.00 CSCL 13A

The proceedings contain thirty-six technical papers on solar energy for U.S. building applications areas; namely, solar collectors, energy storage, domestic hot water heating, energy conservation and insulation, solar air-conditioning, and systems for solar heating and cooling. Some foreign activities are also reviewed. Each technical paper is a report on: proposed reseach, on-going research, proposed systems, or operating systems. Questions and answers from the discussion periods are included, as is an agenda and list of attendees.

N74-14533*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FEASIBILITY OF SPACE DISPOSAL OF RADIOACTIVE NUCLEAR WASTE. 1: EXECUTIVE SUMMARY

Washington Dec. 1973 21 p {NASA-TM-X-2911; E-7679} Avail: NTIS HC \$2.75 CSCL 18G

This NASA study, performed at the request of the AEC, concludes that transporting radioactive waste (primarily long-lived isotopes) into space is feasible. Tentative solutions are presented for technical problems involving safe packaging. Launch systems (existing and planned), trajectories, potential hazards, and various destinations were evaluated. Solar system escape is possible and would have the advantage of ultimate removal of the radioactive waste from man's environment. Transportation costs would be low (comparable to less than a 5 percent increase in the cost of electricity) even though more than 100 space shuttle launches per year would be required by the year 2000. Author

N74-14651*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF WATER INJECTION ON NITRIC OXIDE EMISSIONS OF A GAS TURBINE COMBUSTOR BURNING NATURAL GAS FUEL

Nicholas R. Marchionna, Larry A. Diehl, and Arthur M. Trout Washington Dec. 1973 26 p refs (NASA-TM-X-2959; E-7565) Avail: NTIS HC \$3.00 CSCL

20M

The effect of direct water injection on the exhaust gas emissions of a turbojet combustor burning natural gas fuel was investigated. The results are compared with the results from similar tests using ASTM Jet-A fuel. Increasing water injection decreased the emissions of oxides of nitrogen (NOX) and increased the emissions of carbon monoxide and unburned hydrocarbons. The greatest percentage decrease in NOX with increasing water injection was at the lowest inlet-air temperature tested. The effect of increasing inlet-air temperature was to decrease the effect of the water injection. The reduction in NOX due to water injection was almost identical to the results obtained with Jet-A fuel. However, the emission indices of unburned hydrocarbons. carbon monoxide, and percentage nitric oxide in NOX were not.

N74-14665 Oklahoma Univ., Norman.

MANERGY: AN ENERGY MANAGEMENT MODEL OF THE UNITED STATES FOR THE PREDICTION OF ENERGY DEMAND. RESOURCE CONSUMPTION, ENVIRONMENTAL EFFECTS. THE ASSESSMENT OF NEW TECHNOLOGY, AND ENERGY RESOURCE ALTERNATIVES Ph.D. Thesis

William Woodrow Talley, II 1973 723 p Avail: Univ. Migrofilms Order No. 73-23921

A computerized, systems-analysis model of the United States energy system has been developed and presented in code form. The model was designed for use as a management tool for assessing the consequences of resources and fuel alternatives environmental controls, and technological advances. The assessment guidelines are presented as resource consumptions. environmental impacts, and balance of payment deficits to the year 2100. The model's capabilities and its inherent flexibility have been demonstrated for a baseline case and several alternatives. The base case was based on current energy use patterns, diversified resource development, projected fuel splits, population and gross national product projections, and reasonable advances in technology. The model has sufficient flexibility to include the results of the many existing and future studies on energy supply and demand. It quantifies the impacts of energy policy decisions into acceptable indices. As such, it has the capability to provide energy management guidelines necessary to make decisions on research and development priorities. legislation and regulations. Dissert. Abstr.

N74-14666 Institute of Gas Technology, Chicago. III. REVIEW OF WORLD ENERGY SUPPLIES

Henry R. Linden London Intern. Gas Union 1973 40 p refs Presented at the 12th World Gas Conf., Nice, 1973 (IGU/A-1-73) Copyright. Avail: Issuing Activity

On the basis of currently definable technology and economics, world energy resources are insufficient to support historical rates of growth much beyond the middle of the 21st century. Further, conventional energy supply systems appear to be inadequate to support these growth rates under the expected limitations of the use of investment capital, raw materials, and air, water and land resources. New energy supply systems are discussed, including those for conversion of the lower grades of fossil fuels to nonpolluting fluid fuels and those employing hydrogen as the energy form. The state of technological development of the most promising fossil fuel conversion processes, and their thermal efficiencies, operating characteristics, investment costs. and prospects for industrial use are reviewed. Particular reference is made to the major commercialization effort already underway in the United States. The advantages of a hydrogen-based economy over complete electrification are discussed in detail. Although major emphasis is placed on the adequacy of fossil fuel and uranium resources in meeting future requirements and on delivery systems for these energy sources which are compatible with investment cost and environmental limitations, the major renewable energy resources are also reviewed briefly. Author

N74-14671 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Porz (West Germany). SECTION 4: PROPULSION AND ENERGY [FACHGEBIET 4: ANTRIEBE UND ENERGETIK)

In its DFVLR Annual Review, 1972 1972 p 199-281 refs

Problems of turbojet engines include engine noise and propulsion systems. Investigations on cascades in the trisonic regime, on problems of compressor stages, and on combustion with emission of pollutants are considered. Work on energy transfer and electrical propulsion for space vehicles, technological applications of plasma flows, as well as chemical and physical studies on rocket propulsion systems and their lubricants, is also included Transl. by G.G.

N74-14682*# Techtran Corp., Glen Burnie, Md. ECONOMICS OF AIR TRANSPORT

M. C. Alvarez Washington NASA Jan. 1974 20 p Transl into ENGLISH from Rev. Aeron. Astron. (Spain), no. 388, Mar. 1973 p 173-183

(Contract NASw-2485)

(NASA-TT-F-15249) Avail: NTIS HC \$3.00 CSCL 05C

The costs of air transportation are analyzed, giving attention to direct and indirect costs. Systems of cost analysis are considered together with the effect of individual parameters on the costs of operation. Attention is given to cruising speed, flight time, total operational time, aircraft design, and aircraft manufacture. A first estimation of operational costs has to take into account the weight of the aircraft, the weight of the fuel needed during the flight, the fuel reserve, and questions of the selection of one of three operational approaches in conducting the flight. Direct costs of the flight operation are discussed in detail together with expenses for maintenance, inspection, depreciation, and fuel costs. Indirect expenses include costs of administration, publicity, and airport charges.

N74-14684# RAND Corp., Santa Monica, Calif. ENERGY POLICY RESEARCH AND THE STATE OF FLORIDA

William E. Mooz Aug. 1973 17 p. Sponsored by NSF and the State of Calif.

(P-5078) Avail: NTIS HC \$3.00

A discussion of state energy problems and the research required to support the selection of policies designed to solve them. The example chosen is the State of Florida, in which future energy demands may be in conflict with its unique environment, and the basis for the discussion is Rand's past and present energy work for the National Science Foundation and the State of California. Author

N74-14686# Interior Dept., Washington, D.C. Office of Energy Conservation

FEDERAL AGENCY ENERGY CONSERVATION Quarterly Report, Jul. - Sep. 1973

Dec. 1973 13 p ref

(QR-1) Avail: NTIS HC \$3.00

On June 29, 1973, the President ordered the Federal government to achieve a 7 percent reduction in its anticipated energy consumption over the succeeding 12 months. While there are more than 80 departments and agencies within the Federal government, nearly all of the energy is consumed by the 11 cabinet departments and five large agencies. The focus of the effort has been in these 16 units. In all, a total of 20.8 percent savings in energy was made when compared to anticipated use during FY 1974. Monetary savings amounted to about \$160 million. The Department of Defense is the largest user of energy in the government (86 percent), and it effected the greatest savings, mostly in its diminished use of automotive and aviation fuels. Seven other agencies met or exceeded the goal. Author

N74-14687# Interior Dept., Washington, D.C. Office of Energy Conservation.

FEDERAL ENERGY CONSERVATION Interim Report Oct. 1973 33 p

Avail: NTIS HC \$3.75

This interim report estimates total energy use in the sixteen major Federal agencies during Fiscal Year 1973. It will provide a baseline against which to measure progress in succeeding years. The sixteen largest agencies consumed 2.26 quadrillion British thermal units of energy in Fiscal Year 1973, of which about 60 percent was for vehicle and equipment operations and about 40 percent for building and facility lighting, heating and cooling. Specific actions being taken to achieve the targeted reduction in energy use during the current fiscal year are described. As expected, all agencies will seek to reduce lighting, heating and cooling, as these are the easiest to put into motion, monitor. and adjust as experiences dictate. A host of other ideas have also surfaced, however, including reduced travel and shifts to

more energy-conservative ways to travel, employee participation

through use of public transport, bicycles, and the like.

N74-14688# National Bureau of Standards, Washington, D.C. Inst. for Applied Technology.

ENERGY CONSERVATION THROUGH EFFECTIVE UTILIZA-

Charles A. Berg Feb. 1973 55 p refs (NBSIR-73-102) Avail: NTIS HC \$4.75

In two major sectors of the economy (building services and industrial processes), accounting for approximately 75 percent of the total national energy consumption, energy utilization was found to be inefficient. It is estimated that in these two sectors, as much as 25 percent of the energy consumed annually by the nation as a whole may be lost through ineffective practices. Possible reasons for the existence of ineffective utilization are considered, and possible means of improving effectiveness of ultilization are discussed. The levels of effort to promote effective utilization of energy are identified as: (1) the effective use of present fuels in present processes, (2) utilization of presently unused energy sources, and (3) more effective investment of energy in durable and maintainable products.

N74-14690# Committee on Banking and Currency (U.S. House).

EPA POLLUTION REGULATIONS AND FUEL SHORTAGE: THE IMPACT ON MASS TRANSIT

Washington GPO 1973 689 p refs Hearings before Comm. on Banking and Currency, 93d Congr., 1st Sess., 26, 30, and 31 Jul. 1973

Avail: Subcomm. on Urban Mass Transportation

A hearing was held before the Subcommittee on Urban Mass Transportation of the Committee on Banking and Currency of the House of Representatives to discuss the Environmental Protection Agency pollution regulations and the fuel shortage. Specific emphasis was placed on the impact of the fuel shortage on mass transportation and recommendations for improving mass transportation as an energy saving measure. Testimony from representatives of various petroleum companies was presented to show the causes for the current fuel shortages and steps being taken to improve the situation. The effects of the proposals for reducing fuel shortages on the quality of the environment are emphasized.

N74-14691# Select Committee on Small Business (U. S. House).

ENERGY CRISIS AND SMALL BUSINESS'

GPO Washington 1973 65 p refs Presented to Select Comm. on Small Business, 93d Congr., 1st Sess., 13 Jul. 1973 Avail: Select Comm. on Small Business

Results are presented of an investigation of the petroleum industry made by the Federal Trade Commission. The investigation looks into the growing shortage of gasoline and its effects on small businesses, especially the independent gas station operator. The origins and nature of the present gasoline shortage can only be understood with reference to the structure, conduct and performance of the entire industry. The focus of the discussion includes: background and methodology of the current petroleum investigation: structure, conduct, and performance of the petroleum industry; and Committee staff conclusions.

A.L.

N74-14692# Committee on Commerce (U. S. Senate). ENERGY RESEARCH AND DEVELOPMENT, 2

Washington GPO 1973 166 p Hearing on S. 357 before Comm. on Com., 93d Congr., 1st Sess., 1 Mar. 1973

Avail: Comm. on Com.

A Congressional hearing was conducted to establish a Federal power research and development program to increase efficiencies of electric energy production and utilization, reduce environmental impacts, develop new sources of clean energy, and reduce the use of fossil fuels. The various features of the energy bill are: (1) establishment of a Federal Power Research and Development Board, (2) establishment of a trust fund, (3) authorization of a research program, and (4) definition of penalties for failure to comply with the provisions of the act. The report consists primarily of testimony by witnesses concerning the utilization of energy and new energy sources.

N74-14693# Committee on Commerce (U. S. Senate). NATIONAL FUELS AND ENERGY CONSERVATION ACT OF

Washington GPO 1973 177 p refs Rept. on S.2176 presented by Comm. on Com. at the 93d Congr., 1st Sess., 16 Nov. 1973

(S-Rept-93-526) Avail. US Capitol, Senate Document Room The National Fuels and Energy Conservation Act of 1973 is reported. The purpose of the bill is to declare a national policy of conserving energy resources through more efficient conversion and use, to make energy conservation an integral part of all programs of the Federal Government, and to encourage an energy conservation ethic among American industry and the consuming public. The methods by which these goals are to be achieved are specified. Examples of energy consumption by various components of the national economy are provided.

N74-14695# Oak Ridge National Lab., Tenn. ELECTRIC ENERGY REQUIREMENTS FOR ENVIRONMENTAL PROTECTION

E. Hirst and T. Healy 1973 20 p refs Presented at Conf. on Energy, Demand, Conserv., and Inst. Probl., Cambridge, Mass., 12 Feb. 1973 Sponsored in part by AEC and NSF Prepared in cooperation with Santa Clara Univ., Calif. (Conf-730/205-4) Avail: NTIS HC \$3.00

The amount of electricity needed for (or saved by) operation of several environmental quality strategies is examined. These strategies include: electric mass transit, waste water treatment, solid waste disposal, air pollution control, waste heat dissipation, and electricity conservation. Energy requirements of existing electric mass transit systems are compared with the new BART system, buses, and autos. Electric energy costs, as a function of plant size, are examined for primary/secondary sewage plants. Electricity costs and savings are computed for solid waste disposal, recycle, and use as fuel. Electricity needs for air pollution control at stationary sources and from motor vehicles are evaluated. Electricity needs for use of cooling towers at power plants are reviewed. Finally, potential energy savings which reduce air and thermal pollution levels are examined. The electricity required to meet the needs discussed here-based on the assumptions in this study-are small relative to total kilowatt-hour consumption. Author (NSA)

N74-14749# Institute of Transport Aviation, Paris (France). AVIATION NEEDS AND PUBLIC CONCERNS

Emile VanLenner 29 Oct. 1973 22 p Presented at 7th Dr. Albert Plesman Mem. Lecture, Delft, Netherlands, 29 Oct. 1973 Avail: NTIS HC \$3.25

Economic profits in the continuous growth of civil aviation are weighed against the social impact on human life in the building of Europe's transportation network. Problems of aircraft noise, demands on energy resources, airport congestion, and consequently of environmental control are considered. G.G.

N74-14784* National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
METHOD OF MAKING SILICON SOLAR CELL ARRAY

METHOD OF MAKING SILICON SOLAR CELL ARRAY Patent

Americo F. Forestieri, Jacob D. Broder, and Daniel T. Bernatowicz, inventors (to NASA) Issued 25 Dec. 1973 4 p Filed 26 Oct. 1970 Supersedes N71-29048 (09 - 16, p 2541) (NASA-Case-LEW-11069-1; US-Patent-3,780,424;

US-Patent-Appl-SN-83816; US-Patent-Class-29-572;

US-Patent-Class-136-89; US-Patent-Class-29-588) Avail: US Patent Office CSCL 10C

A heat sealable transparent plastic film, such as a flourinated ethylene propylene copolymer, is used both as a cover material and as an adhesive for mounting a solar cell array to a flexible substrate.

Official Gazette of the U.S. Patent Office

N74-14785*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

IMPINGING JET SEPARATORS FOR LIQUID METAL

MAGNETOHYDRODYNAMIC POWER CYCLES

David W. Bogdanoff 1 Dec. 1973 155 p refs Sponsored in part by NAS-NRC

(Contract NAS7-100)

(NASA-CR-136552: JPL-TM-33-621) Avail: NTIS HC \$9.75 CSCL 10A

In many liquid metal MHD power, cycles, it is necessary to separate the phases of a high-speed liquid-gas flow. The usual method is to impinge the jet at a glancing angle against a solid surface. These surface separators achieve good separation of the two phases at a cost of a large velocity loss due to friction at the separator surface. This report deals with attempts to greatly reduce the friction loss by impinging two jets against each other. In the crude impinging jet separators tested to date, friction losses were greatly reduced, but the separation of the two phases was found to be much poorer than that achievable with surface separators. Analyses are presented which show many lines of attack (mainly changes in separator geometry which should vield much better separation for impinging jet separators).

Author

N74-14788*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

THE NASA-LEWIS TERRESTRIAL PHOTOVOLTAICS **PROGRAM**

Daniel T. Bernatowicz 1973 8 p refs Presented at 10th Photovoltaics Specialists Conf., Palo Alto, Calif., 13-15 Nov. 1973; sponsored by IEEE

(NASA-TM-X-71491; E-7828) Avail: NTIS HC \$3.00 CSCL 10A

Research and technology efforts on solar cells and arrays having relevance to terrestrial uses are outline. These include raising cell efficiency, developing the FEP-covered module concept. and exploring low cost cell concepts. Solar cell-battery power systems for remote weather stations have been built to demonstrate the capabilities of solar cells for terrestrial applica-

N74-14791# Council on Environmental Quality, Washington,

ENERGY AND THE ENVIRONMENT: ELECTRIC POWER Aug. 1973 66 p refs

(PB-223326/0GA) Avail: NTIS SOD HC \$0.85 as 4111-00019 CSCL 13B

The conflict between energy needs and the environment poses a problem that must be solved by understanding the factors that influence demands for energy and by developing energy systems that meet these demands with minimal damage to the environment. This report considers the elements underlying our growing demand for energy and the environmental implications of the complex energy systems for meeting this demand. It focuses on electric energy because of the particularly rapid growth in this sector.

N74-15020*# Servicio Geologico de Bolivia, La Paz.
PETROLEUM EXPLORATION SUBPROGRAM: GEOLOGI-CAL INTERPRETATION OF PROPORTIONAL IMAGERY FROM ERTS-A SATELLITE [SUB PROGRAMA EXPLORA-CION PETROLERA: INTERPRETACION GEOLOGICA DE IMAGENES PROPORCIO NADAS POR EL SATELITE ERTS-A

C. E. Brockmann, Principal Investigator and Carlos Vargas Flores 30 Nov. 1973 14 p In SPANISH Sponsored by NASA ERTS

(E74-10213; NASA-CR-136476) Avail: NTIS HC \$3.00 CSCL

There are no author-identified significant results in this

N74-15070*# Scientific Translation Service, Santa Barbara,

OIL EXPLORATION SUBPROGRAM GEOLOGICAL IN-TERPRETATION OF IMAGES PROVIDED BY THE ERTS-A

SATELLITE

C. Vargas F. Washington NASA Jan. 1974 10 p Transl. into ENGLISH of "Sub Program a Exploracion Petrolera Interpretacion Geologica de Imagenes Proporcio Nadas por el Satelite ERTS-A", Servicio Geol. de Bolivia, Programa del Satelite Technol, de Resursos Nat., La Paz, report, 1973, 9 p. (Contract NASw-2483)

(NASA-TT-F-15265) Avail: NTIS HC \$3,00 CSCL 08G

Geological interpretation of three black and white images provided by the ERTS-A satellite is discussed. The study was to determine to what extent these images may be used to compile deological survey maps, using conventional photointerpretation techniques in the process. Author

N74-15226 Geological Survey, Washington, D.C. BITUMEN-BEARING ROCKS

W. B. Cashion In its US Mineral Resources 1973 n 99-104 refs

Bitumen bearing rocks occur in many areas in the United States, but few deposits have been exploited or evaluated for their total energy potential. The evaluated deposits are a relatively small part of North American resources of bitumen bearing rocks and probably will not contribute to U.S. energy needs before 1985. Studies of known but unappraised deposits, especially extensive subsurface tar sands, will greatly increase total resource estimates. Technological advancements are needed in tar sand processing, especially for in situ recovery methods.

N74-15230 Geological Survey, Washington, D.C. COAL

Paul Averitt In its US Mineral Resources 1973 p 133-142 refe

World coal resources are estimated to total 16,830 billion tons, of which 9,500 hillion tons is classed as identified, and 7,330 billion tons is classed as hypothetical. The United States contains about one-fifth of estimated total world resources. On a uniform Btu basis, U.S. coal resources are larger than the combined domestic resources of petroleum, natural gas, oil shale, and bituminous sandstone. The prolonged future need for energy in ever increasing quantities, and the prospect of decreasing availability of and increased prices for petroleum and natural gas, have focused very sharp attention on coal as an alternative source of synthetic gas, liquid fuels, and lubricants.

N74-15240 Geological Survey, Washington, D.C. GEOTHERMAL RESOURCES

L. J. P. Muffler In its US Mineral Resources 1973 p 251-261

The geothermal resource base is defined as all the heat above 15 C in the earth's crust, but only a small part of this resource base can properly be considered as a resource. The magnitude of the geothermal resource depends on the evaluation of many physical, technological, economic environmental, and governmental factors. The physical factors that control the distribution of heat at depth can be evaluated, at least rudely. More tenuous are the assumptions of technology, economics, and governmental policy. These assumptions are critical to geothermal resource estimation.

N74-15257 Geological Survey, Washington, D.C. NUCLEAR FUELS: URANIUM

Warren I. Finch, Arthur P. Butler, Jr., Frank C. Armstong, and Albert E. Weissenborn In its US Mineral Resources p 456-468 refs

Uranium is an important energy resource, and even though the demand for its use in nuclear-powered electrical generators was only moderate in 1972, near-future needs are expected to be very great. In the United States, large exploitable deposits are found chiefly in sandstone and associated rocks. In other parts of the world, large deposits are mainly in quartz-pebble conglomerate of early Precambrian age and in veins. Domestic resources recoverable at present prices totaled about 273,000

tons of U308 at the end of 1971, and the total for all countries reporting resources is about 1.6 million tons of U308. These supplies are sufficient to last into the 1980's. Needs beyond 1980 are so great that tremendous efforts in exploration, and research in ore-finding techniques, will be required to discover new recoverable resources. Author

N74-15258 Geological Survey, Washington, D.C.

NUCLEAR FUELS: THORIUM

Mortimer H. Staatz and Jerry C. Olson. In its US Mineral Resources 1973 p 468-476 refs

Although the current demand for thorium is small, future needs may be large as a fuel for nuclear generators. The occurrence of thorium is widespread, and large deposits are found in beach and fluviatile placers, veins, sedimentary rocks, alkalic igneous rocks, and carbonatities. Thorium has been produced principally from monazite from beach and fluviatile placers, although in the 1950's and early 1960's monazite from a unique vein in South Africa was the chief source. In the early 1970's monazite was recovered principally as a byproduct of titanium or tin mining in India, Brazil, Australia, and Malaysia. A large thorium resource in the conglomerates at the Elliot Lake uranium mines. Canada, could become an important byproduct if demand increases. Thorium resources are not well known because of the small demand, but are sufficient for many years in the future. The development of a variable domestic thorium mining industry is dependent on a large enough increase in demand to exceed the amount obtainable as byproducts from other types of deposits.

N74-15259 Geological Survey, Washington, D.C. OIL AND GAS

T. H. McCulloh In its US Mineral Resources 1973 p 477-496

The oil and gas resources of the United States are examined. Organic carbon, hydrocarbons, and producible hydrocarbon accumulations are discussed from the standpoint of distribution and accessibility. All estimates of petroleum and natural gas resources depend upon prior exploration results and are considered unreliable. Changing economic incentives, technologic advances, enlarged prospecting areas, and creative thinking all increase exploration effectiveness. Data are presented to show variations in produced and proven reserves of oil for the U.S. and the world

N74-15260 Geological Survey, Washington, D.C. OIL SHALE

William C. Culbertson and Janet K. Pitman In its US Mineral Resources 1973 p 497-503 refs

Oil shale is a fine-grained sedimentary rock containing organic matter that has the property of yielding substantial amounts of oil when heated in a closed retort (destructive distillation) but that is mostly insoluble in ordinary petroleum solvents. The United States has tremendous quantities of oil shade, principally in the Green River Formation in Colorado, Utah, and Wyoming. These three States contain identified resources of about 1.8 trillion barrels of oil in oil shale that yields an average of 15 or more gallons per ton. However, no oil-shale venture has been a commercial success in the United States in the last 100 years, despite the fact that other countries of the world have for many years burned oil shale as a fuel, or have produced oil or combustible Author gas from the shale.

N74-15261 Geological Survey, Washington, D.C. PEAT

Cornelia C. Cameron In its US Mineral Resources 1973 p 505-513 refs

The physical characteristics of peat that are important to modern uses are related to the geologic and physiographic settings of the deposits. Research on methods of prospecting for peat focuses on establishing geologic controls for the types of peat defined in the classification adopted by the American Society for Testing and Materials in 1969. This new classification is designed principally to characterize different types of peat by

means of such physical properties as amount, kind, and size of fibers and quantity of ash. One or more types of peat occur in all but about 8 of the 50 States in magnitudes ranging from hundreds of thousands to tens of billions of tons. The demand for specific physical qualities in peat related to modern uses and to standards for sales is largely responsible for national consumption of more peat than is produced domestically.

N74-15290# National Commission on Materials Policy. Washington, D.C.

COMPENDIUM OF UNIVERSITY FORUMS OF THE NATIONAL COMMISSION ON MATERIALS POLICY, MAY JUNE 1972. A BACKGROUND DOCUMENT: UNIVERSITY FORUM ON NATIONAL MATERIALS POLICY, MASSACHU-SETTS INSTITUTE OF TECHNOLOGY ON 30 MAY - 2 JUNE 1972

Allen F. Agnew Aug. 1973 733 p refs (PB-223678/4GA; NCMP-UF-3) Avail: NTIS HC \$38.75 CSCL 05C

The Massachusetts Institute of Technology Forum covered six subjects; materials problems in energy conversion, research in advanced materials; national policy on resources, waste recycling, and education and a national materials policy. Specialty metals, coal conversion, electronic materials, aerospace structural materials, biomaterials, and polymeric materials were all considered in depth as were recycling of solid refuse and the effect of recycling on materials supply. Relationships to man were examined via the topic human ecology and compatible technology.

N74-15291# National Bureau of Standards, Washington, D.C. Inorganic Materials Div.

INVESTIGATION OF VISCOUS FLOW IN GLASS DURING PHASE SEPARATION Annual Report, Nov. 1972 Jun. 1973

J. H. Simmons, S. A. Mills, A. Napolitano, D. H. Blackburn, and W. K. Haller Sep. 1973 44 p refs

(Contract NAonr-12-73; NR Proj. 032-536; NBS Proj. 31304) (AD-767920; NBS-TN-792; AR-1) Avail: NTIS MF \$1.45; SOD HC \$0.65 as C13.46:792 CSCL 11/2

The isothermal viscosity of two borosilicate glasses, of which one is a commercial glass widely used for chemical glassware, shows a large increase (4 to 5 orders of magnitude) with heat-treatment time (ranging up to 100,000 min) near the annealing point. The two glasses have similar compositions, but differ greatly in their phase separation characteristics. Electron micrographs are used to analyze the development of microstructure during the suspected phase separation. In both glasses, it is found that the structure development is primarily responsible for the viscosity increase. An analysis of the data, and a theoretical interpretation of the effect are presented.

Author (GRA)

N74-15447 Wyoming Univ., Laramie. LOW ENERGY GAS UTILIZATION IN COMBUSTION GAS TURBINE Ph.D. Thesis

John M. Cegielski, Jr. 1973 335 p

Avail: Univ. Microfilms Order No. 73-25541

Gases having a net heat of combustion less than 150 Btu per standard cubic foot were successfully used to partially fuel a modified 11.2 kilowatt combustion gas turbine generator set. A modification to the combustion gas turbine engine enabled the low energy gases to be substituted for a portion of the compressed air normally supplied to the combustion chamber. Two sets of field tests were conducted. The first test set used the exhaust gas (Sloss gas) from a secondary oil recovery operation. The second set used the stack gas from an experimental oil-shale retort. Twelve stack gas combustion efficiency tests were conducted. An average of 70.3% of the stack gas net heat of combustion which ranged from 28.9 to 51.5 Btu per standard foot was utilized by the combustion gas turbine engine. Thirty-six Sloss gas combustion efficiency tests were conducted. An average of 70.1% of the Sloss gas net heat of combustion which was 147 Btu per standard cubic foot was utilized by the combustion gas turbine engine. Dissert, Abstr.

N74-15448# Oak Ridge National Lab., Tenn. STORAGE AND TRANSPORTATION OF SYNTHETIC FUELS. A REPORT TO THE SYNTHETIC FUELS PANEL

J. E. Johnson Sep. 1972 20 p refs (Contract W-7405-eng-26) (ORNL-TM-4307) Avail: NTIS HC \$3.00

A review of the problems associated with the storage and transportation of energy by the major candidate synthetic fuel systems hydrogen and hydrogen-derived fuels, such as ammonia and methanol is presented. Particular emphasis has been placed on the identification of limiting technologies and on areas in which research and development efforts should be undertaken to contribute solutions to the nation's growing problems of energy resources, transmission and conversion. Author (NSA)

N74-15449# Oak Ridge National Lab., Tenn. PROSPECTS FOR HYDROGEN AS A FUEL FOR TRANSPOR-TATION SYSTEMS AND FOR ELECTRICAL POWER GENERATION

W. J. D. Escher Sep. 1973 56 p. refs (Contract W-7405-eng-26)

(ORNL-TM-4305) Avail: NTIS HC \$5.00

The potential application of hydrogen, produced from non-fossil domestic sources, is examined for applicability to the transportation and electrical generation sectors. The characteristics of hydrogen as a gas and as a cryogenic liquid are noted; cost trends are presented. Ground, water, and air transportation modes and systems are individually examined with respect to a potential conversion to hydrogen fuel. Electrical generation systems, both conventional and unconventional, are assessed similarly. Hydrogen's potential for transmission and storage of electrical energy is cited. From these findings, a detailed list of recommended study, research and development, and demonstration system topics is given toward implementing an eventual conversion of transportation and the electrical utilities to hydrogen Author (NSA) fuel

N74-15661# Interior Dept., Washington, D.C. ASSESSMENT OF GEOTHERMAL ENERGY RESOURCES Dallas L. Peck 25 Sep. 1972 86 p refs Avail: NTIS HC \$6.50 CSCL 20M

A study was conducted to develop and assessment of the state of the art and to recommend a research program to provide the basis for establishing the proper role of geothermal resources. It is expected that geothermal resources can accomplish the following: (1) provide additional energy to alleviate the Nation's impending storage, (2) water to supplement present supplies, and (3) mineral resources. It was recommended that an expanded program be conducted to assess the magnitude, type, and location of the Nation's geothermal resources and to sour the development of improved technology for discovering, evaluating, and utilizing the resources. The significant accomplishments to be realized by such a program are defined. Author

N74-15667 California Inst. of Tech., Pasadena. Environmental

TIME FACTORS IN SLOWING DOWN THE RATE OF GROWTH OF DEMAND FOR PRIMARY ENERGY IN THE UNITED STATES

Lester Lees and Mingin Philip to 1 Jun. 1973 35 p refs (Grant NSF GI-29726)

(EQL-7) Copyright. Avail: Issuing Activity

The time scales involved in slowing down the rate of growth of primary energy consumption in the U.S., as one component of an overall energy/environment strategy designed to limit the required volume of energy imports from overseas are discussed. Two important energy-consuming sectors of the economy are chosen as illustrative examples: (1) the automobile as a total

system (25%); (2) space heating, air conditioning and water heating. in the residential sector (22%). These two components of an energy-conserving policy taken together would bring the growth rate in U.S. primary energy demand down from its present rate of 4.2% per year to about 2.8% per year by 1985. Reductions in the annual growth rate of the remaining 50% of U.S. primary energy consumption that seem quite feasible would bring the overall growth rate down to about 2.5% per year by 1985, if reductions in growth rate of this magnitude could in fact he achieved, energy imports would peak in the mid-1980s at a level no higher than about 60% above the present (1973) volume of imports. Incentives and disincentives designed to bring about this slowdown in the rate of U.S. energy consumption are discussed. Author

N74-15679# Commission of the European Communities, Brussels (Relaium)

THE ENERGY SITUATION IN THE COMMUNITY, SITUA-TION 1972, FORECASTS 1973

9 Feb. 1973 55 p

Avail NTIS HC \$4.75

An analysis of the world energy situation in 1972 and the outlook for 1973 are presented. The development of an energy policy which would improve the quality of information available concerning energy requirements and problems is discussed The market situation in 1972 and its consequences are examined for the specific cases of petroleum, coal, gas, electricity, and nuclear energy. Tables, charts, and graphs are included to show consumption rates and predicted consumption of the significant natural resources used for energy conversion. Author

N74-15680# Committee on Science and Astronautics (U. S. House)

INDIVIDUAL ACTION FOR ENERGY CONSERVATION Washington GPO Jun. 1973 8 p. Presented to Comm. on Sci. and Astronaut., 93d Congr., 1 st Sess., 31 May 1973 Avail: Subcomm. on Energy

Promoted by a concern for conserving the limited energy supplies, suggestions are given for saving money and using less energy, Ideas are presented for: driving and purchasing automobiles; cooling and heating residential homes; using home appliances; and vacationing. кмм

N74-15681# National Economic Research Associates, Inc., New

ENERGY CONSUMPTION AND GROSS NATIONAL PRODUCT IN THE UNITED STATES: AN EXAMINATION OF A RECENT CHANGE IN THE RELATIONSHIP 1971 29 p refs

Copyright. Avail: NTIS HC \$3.50

The ratio of aggregate energy consumption to Gross National Product (the energy/GNP ratio) underwent a long-term secular decline during the period 1947-1966, following a trend that began in the 1920s. Since 1966, however, the trend has reversed and the ratio has shown an uninterrupted increase. If the trend prior to 1966 had persisted, energy consumption in 1970 would have been lower by an amount greater than the total electric utility consumption of coal in that year. An analysis of the possible reasons for this trend reversal indicates that it cannot be ascribed to any single cause but that a major part of it is apparently the result of: (1) the increasing relative importance of nonenergy uses of the fuels. (2) a tapering off in the year-to-year improvement in thermal efficiency at central power stations, and (3) the increasing relative importance of air conditioning and electric heating. The net result of these factors is a tendency toward a sustained high growth rate in aggregate energy consumption and a consequent increase in the energy/GNP ratio except in years of high GNP growth rate.

N74-15682# Committee on Government Operations (U. S. House).

CONSERVATION AND EFFICIENT USE OF ENERGY.

Washington GPO 1973 469 p refs Hearings before Comm. on Govt. Operations and Comm. on Sci. and Astronaut., 93d Congr., 1st Sess., No. 14, 19 Jun. 1973 Prepared in cooperation with Comm. on Sci. and Astronaut.

Avail: SOD HC \$3.05

A Congressional hearing on the conservation and efficient use of energy resources is presented. The organization and functions of the Office of Energy Conservation are described. Current research and development projects being conducted by the government to conserve energy resources by increasing the efficiency of converting heat energy to electricity are explained. Improvements and developments in surface transportation systems for increased efficiency are reported. Specific research and development projects are defined to show the scope of the effort, the FY 1973 funding, and the proposed FY 1974 funding.

P.N.F.

N74-15684# Committee on Interior and Insular Affairs (U. S. Senata)

FACTORS AFFECTING THE USE OF COAL IN PRESENT AND FUTURE ENERGY MAKERS

Washington GPO 1973 46 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 1973 Prepared by Library of Congr.

Avail: Comm. on Interior and Insular Affairs

A bakground paper to inform members of Congress on the factors affecting the use of coal in present and future energy markets is presented. The subjects discussed are: (1) coal reserves, (3) mining regulations, (4) air pollution control for coal burning utilities, and (5) the policy issues which must be considered in the Federal government for adequate exploitation of coal supplies. Tables are included to show yearly consumption, forecasts of 1980 demand, potential domestic supply available, and coal characteristis by states.

N74-15685# Geological Survey, Washington, D.C. ENERGY RESOURCES OF THE UNITED STATES
P. K. Theobald, S. P. Schweinfurth, and D. C. Duncan 197
30 p. refs

(CIRC-650) Avail: NTIS MF \$1.45; USGS HC no charge

The accompanying diagrams present the U.S. Geological Survey estimates of the United States resources of coal, petroleum liquids, natural gas, uranium, geothermal energy, and oil from oil shale. The estimates have been complied by a group of specialists familiar with each of the energy sources, each using techniques he considers most useful for estimating his particular energy source. The short text accompanying each diagram outlines the method of estimation or the source of the estimate and defines the characteristics of each estimate. Where appropriate, comparisons with other estimates are also given. Resources, as used here, include all rocks and minerals (including their contained heat for geothermal sources) potentially usable by man. Author

N74-15688# Committee on Interior and Insular Affairs (U. S. Senate)

RESPECT TO FUELS AND ENERGY: A STAFF ANALYSIS Washington GPO 1973 240 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 1973 Avail: SOD HC \$1.65

A Congressional committee report on the authority of Federal agencies with respect to fuels and energy emergency management is presented. It is stated that more than forty Federal departments. agencies, and regulatory commissions affect energy matters. The reorganization and restructuring of these Federal energy activities is a principal concern of the Committee involved in the energy study. A staff analysis is developed to show the statutory authority of Federal agencies and the implementation of that authority in the energy field. The staff analysis is based on a questionnaire which requested the following information: (1) goals and objectives of the energy and (2) a summary of their respective roles within the overall body of Federal fuels and energy policy formulation and implementation. The term Energy Policy is define as all basic legal authority which authorized programs or policies designed to assist, to promote, to regulate, or to impose constraints on the range of alternatives which local. State, Federal, or private descision makers may consider in their effort to meet existing and future energy demands. Author

N74-15687# Committee on Interior and Insular Affairs (U. S. Sanata)

THE PRESIDENT'S ENERGY MESSAGE AND S. 1570

Washington GPO 1973-869 p refs Hearing pursuant to S. Res. 45 before Comm. on Interior and Insular Affairs, 93d Congr.. 1st Sess... 1 May 1973

Avail: Comm. on Interior and Insular Affairs

The message of the President of the United States concerning energy recourses which was delivered to the Committee on Interior and Insular Affairs on 1 May, 1973 is presented. The subjects discussed are: (1) the National energy policy, (2) developing domestic energy resources, (3) importing fuels to meet demands, (4) conserving energy, (5) research and development projects for energy sources, and (6) international cooperation. The message prepared the development of legislation to authorize the President to allocate energy and fuels when he determines and declares that extraordinary shortages or dislocations in the distribution of energy and fuels exist or are imminent. The legislation provides for the delegation of authority to the Secretary of the Interior to carry out the provisions of the bill. Author

N74-15688# Committee on Interior and Insular Affairs (U. S. Sanate)

SUMMARY OF THE ENERGY CONSERVATION AND DEVELOPMENT RECOMMENDATIONS CONTAINED IN THE FINAL REPORT OF THE NATIONAL COMMISSION ON MATERIALS POLICY, JUNE 1973: A BACKGROUND PAPER

Washington GPO 1973 35 p refs Presented to Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., Jun. 1973 Prepared by Library of Congr.

Avail: SOD HC \$0.35 Domestic Post Paid or \$0.20 GPO Bookstore

A summary of the energy conservation and development recommendations was presented to the U.S. Congress pursuant to Senate Resolution 45. The summary was based on the final report of the National Commission on Materials Policy. The seven functions which are to be served by the national materials policy are defined. The major theme of the report is the need to strike a balance between producing goods and protecting the environment. A second theme is the need for a balance between the supply of materials and the demand for their use by increasing primary materials production. Specific recommendations are submitted for the following: (1) disposition of wastes. (2) development of energy sources, (3) land use, (4) water use, and (5) international aspects of the materials policy. The requirements for science and technology, research and development, and inventories of materials are included.

N74-15689# Westinghouse Electric Corp., East Pittsburgh, Pa. Fuels and Energy Systems.

THE EFFECT OF FUEL AVAILABILITY ON FUTURE R AND D PROGRAMS IN POWER GENERATION

L. G. Hauser, W. H. Comtois, and R. R. Boyle Apr. 1972 20 p refs Presented at Am. Power Conf., Chicago, 18-20 Apr. 1972

Avail: NTIS HC \$3.00

An analysis of the energy requirements of various sectors of the U.S. economy is presented. Charts are developed to show trends in energy consumption and predictions of energy availability. The use of the load duration curve as a method for analyzing future electrical energy production is explained. Graphs are included to show the distribution of energy generated by capacity factor of the generating plants. Future research and development programs with emphasis on nuclear fuels and breeder reactors as a solution to the energy shortage are proposed. The creation and utilization of new methods for exploiting coal reserves are stressed.

N74-15690# Committee on Interior and Insular Affairs (U. S. Senate).

ENERGY CONSERVATION, PART 1

Washington GPO 1973 482 p refs Hearings pursuant to S. Res. 45 before Comm. on Interior and Insular Affairs, 93d Congr., 1st Sess., 22-23 Mar. 1973

Avail: Comm. on Interior and Insular Affairs

A Congressional hearing on the role of energy conservation in the National energy policy was conducted. The hearing assisted members of Congress and other interested parties in their understanding of the issues inherent in the formulation of a long-term National Energy Policy which assures the continued welfare of the Nation including balance growth safeguarding and enhancing the quality of the environment, and national security. The questions addressed in the hearings were directed toward: (1) the general issue of energy conservation. (2) detailed questions and policy issues. (3) requirements of the transportation sector, (4) requirements of the residential/commercial sector, (5) requirements of the industrial sector, and (6) requirements of the electric utilities.

N74-15691# Bureau of Mines, Bartlesville, Okla. Energy Research Center.

SELECTED LIST OF BUREAU OF MINES PUBLICATIONS ON PETRÖLEUM AND NATURAL GAS, 1961-1970
V. Vern Hutchinson [1972] 165 p refs Supplement to RM-IC-8240

(BM-IC-8534; BM-IC-8240-Suppl) Avail: SOD HC \$1.75

This selected list contains 829 entries with citations to publications related to petroleum and natural gas, which were released during the 1961-1970 period. Some entries are multiple in nature, resulting in a total of 881 citations. The purpose of this bibliography is to provide a selective review of publications related to petroleum and natural gas during the 1961-1970 period. The publications are grouped under broad headings as shown in the contents section. Indexes, placed at the end of the list, identify publications by author with short title, detailed subject approaches, and report numbers. As the title indicates, the publications included have, for the most part, a direct and specific relationship to petroleum and natural gas. In some selections, however, the reports included are applicable to other energy fuels as well.

N74-15695# Mitre Corp., McLean, Va. ENERGY, RESOURCES AND THE ENVIRONMENT Charles A. Zraket 24 Oct. 1972 38 p Revised (M72-180-Rev-1) Avail: NTIS HC \$4.00

The proceedings of eight symposia on the subject of energy resources and requirements are summarized. The subjects discussed include the following: (1) the long term energy situation, (2) the future outlook for energy and resources, (3) the international context. (4) the intermediate situation or energy crisis, (5) options for the long term situation, (6) transportation requirements, (7) current problems with the environment, and (8) long term environment impact factors.

N74-15697# Chase Manhattan Bank, New York. Energy Economics Div.

OUTLOOK FOR ENERGY IN THE UNITED STATES TO 1985

John G. Winger, Gerald D. Gunning, John D. Emerson, Richard C. Sperling, and Arthur J. Zraly Jun. 1972 56 p Avail: NTIS HC \$5.00

The energy requirements of various sectors of the U.S. economy are analyzed. Graphs and charts are developed to show previous energy consumption levels and predictions are made for future requirements to 1985. A comparison is made for the amounts of energy in the form of oil, natural gas, coal, water, and nuclear used by various geographical areas of the United States. Tables of data are prepared to show the potential sources of energy, both foreign and domestic. The economic impact of depending on foreign sources for resources is analyzed.

N74-15698# RAND Corp., Santa Monica, Calif.
RESIDENTIAL ENERGY USE: AN ECONOMETRIC ANALYSIS

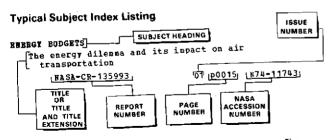
Kent P. Anderson Oct. 1973 89 p refs (Grant NSF GI-44) (R-1297-NSF) Avail: NTIS HC \$6.50

The demands of the residential sector of the U.S. economy for energy resources in the form of gas and electricity are discussed. Tables of data are presented to show the various predictions concerning the future price of electricity and natural gas to the consumer. Methods for predicting the future cost of energy resources are explained. The energy requirements for residential use are expressed in mathematical models and the results are tabulated for type of fuel, type of home, and specific use within the home.

SUBJECT INDEX

ENERGY / A Continuing Bibliography (Suppl. 01)

MAY 1974



The subject heading is a key to the subject content of the document. The title or title and title extension provides the user with a brief description of the and accession numbers are located beneath and to the right of the title eg.

subject matter. The report number helps to indicate the type of document cited (eg., NASA report, translation, NASA contractor report). The issue page 01 p 0015 N74-11743. Under any subject heading the accession numbers are arranged in sequence with the IAA accession numbers appearing first. ACCELEROMETERS Quarterly bulletin of the Division of Mechanical Enqineering and the National Aeronautical Establishment, 1 July - 30 September 1973 --- reports on revnolds number effects, energy in transportation, and wave buoy accelerometer [DME/NAE-1973(3)] 01 p0023 N74-01 p0023 N74-13673 ARRIAL PHOTOGRAPHY Strip-mined watershed hydrologic data acquisition study --- remote infrared aerial photography {PB-223558/8GA] 01 p0025 N74-14105 ABRODINANIC CONFIGURATIONS Refan program. Phase 1: Summary report
[NASA-TH-X-71456] 01 p0009 N74-10043 ARRONAUTICAL ENGINEERING Quarterly bulletin of the Division of Mechanical Engineering and the Mational Aeronautical Establishment, 1 July - 30 September 1973 reports on reynolds number effects, energy in transportation, and wave buoy accelerometer [DME/NAE-1973(3)] 01 p0023 N7 01 p0023 N74-13673 ABBOSPACE SCIENCES Industrial use of aerospace technology 01 p0002 A74-12905 ARROSPACE VEHTCLES Section 4: Propulsion and energy 01 p0026 N74-14671 AIR POLLUTION Conversion of fuel pitrogen to NOx in a compact combustor ASME PAPER 73-WA/GT-2] 01 p0002 A74-13293 Aviation fuels and lubricants 01 p0006 A74-18180 The jet engine design that can drastically reduce oxides of nitrogen [AIAA PAPER 74-160] 01 m0006 A74-18797 The association of automotive fuel composition with exhaust reactivity [PB-222609/0] 01 p0010 N74-10129 Catalytic combustion of carbon monoxide in

gasoline engine exhaust using manganese catalysts

Energy demand and its effect on the ennyironment

Substitute catalysts for platinum in automobile

Present air pollution situation in Kawasaki city

emission control devices and petroleum refining

01 p0011 N74-10874

01 p0017 N74-11790

01 p0018 N74-11941

01 p0018 N74-12321

[AD-7603951

[PB-222167/9]

and future countermeasures

fP-50481

emissions of a gas turbine combustor burning patural gas fuel [NASA-TM-X-2959] 01 p0025 N74-14651 EPA pollution regulations and fuel shortage: The impact on mass transit 01 p0027 N74-14690 ATE PERTFICATION Combustion of the gases methane, LP gas and ammonia in a mixing reactor --- air pollution control device FF0A-1-C-1442-H3 1 01 p0022 N74-12824 AIR TRAPPIC CONTROL Power conditioning system for FAA Air Route Traffic Control Centers 01 p0004 A74-14133 Power conditioning system for PAA air route traffic control centers 01 p0019 N74-12636 ATR TRANSPORTATION The energy dilemma and its impact on air transportation [NASA-CR-135993] 01 p0015 N74-11743 The air transportation/energy system 01 p0016 N74-11745 Energy conservation and air transportation 01 p0016 N74-11746 Conclusions and recommendations --- for problems in energy situation, air transportation, and hydrogen fuel 01 p0016 N74-11748 Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses (P-5046) Operations and private energy uses (P-5046) O1 p0017 N74-11791 Where are we headed in air transport? --- trends for future aircraft design 01 p0020 N74-12669 Air mobility fuel cell study --- desulfurization [AD-766757] 01 p0022 N74-12742 Bconomics of air transport --- direct and indirect costs FNASA-TT-P-152491 01 p0026 N74-14682 AIRCRAFT DESIGN The technology and economics of commercial airplane design. I 01 p0001 A74-10144 Where are we headed in air transport? --- trends for future aircraft design 01 p0020 N74-12669 ATROPART ENGINES Phase 1: Summary report Refar program. [NASA-TH-X-71456] 01 p0009 N74-10043 Aviation gas turbine engines (selected portions)
[AD-756810] 01 p0011 N79-1 01 p0011 N74-10751 AIRCRAFT PUBL SISTEMS Aircraft fuel system tests with gelled fuel-flowmeter calibration, fuel boost pump and jettison tests [FAA-MA-73-43] 01 p0017 N74-11828 AIRCRAPT PUBLS The hydrogen fuel economy and aircraft propulsion falax Paper 73-13191 01 00006 a74-17 01 p0006 A74-17905 Aviation fuels and lubricants 01 p0006 A74-18180 Aviation turbine fuels, 1972 01 p0014 N74-11592 Aircraft fuel system tests with gelled fuel-flowmeter calibration, fuel boost pump and jettison tests [FAA-NA-73-43] 01 p0017 N74-11828

Effect of water injection on nitric oxide

•	
AIRCRAFT INDUSTRY	Selected list of Bureau of Mines publications on
Aviation needs and public concerns civil	petroleum and natural qas, 1961-1970
aviation growth in Europe and environmental control	[BM-IC-8534] 01 p0032 N74-15691
01 p0027 N74-14749	Bitumen-bearing rocks as potential energy
AIRCRAPT HOISE Befan program. Phase 1: Summary report	sources
[NASA-TM-X-71456] Submary report [NASA-TM-X-71456] 01 p0009 N74-10043	BOLIVIA 01 p0028 N74-15226
AIRCRAFT PERFORMANCE	Petroleum exploration subprogram: Geological
The case for hydrogen fueled transport aircraft	interpretation of proportional imagery from
[AIAA PAPER 73-1323] 01 p0002 A74-11315 Performance and noise aspects of supersonic	ERTS-A satellite [E74-10213] 01 00028 N74-15020
transport	Oil exploration subprogram geological
01 p0003 A74-13798 AIRLINE OPERATIONS	interpretation of images provided by the ERTS-A
The technology and economics of commercial	satellite Bolivia
airplane design. I	[NASA-TT-F-15265] 01 p0028 N74-15070 BOUNDARY LAYER CONTROL
01 p0001 a74-10144	On the theory of alternating-current
Investigations using data in Alabama from ERTS-A	electrofluiddynamic converters
land use, mineral exploration, qeology,	BOUNDARY LAYER PLOW 01 p0007 A74-18988
hydrology, water resources, data processing, data management, marine environments	Design considerations for the airframe-integrated
(E74-10124) 01 p0023 N74-13051	SCTabjet [NASA-TM-X-2895] 01 00019 N74-12418
ALTERNATING CURRENT	[NASA-TM-X-2895] 01 p0019 N74-12448
On the theory of alternating-current electrofluiddynamic converters	C
01 p0007 A74-18988	CARBON DIOXIDE
ANTIREPLECTION COATINGS	Physical behaviour of some biowaste gases in an
Vitreous oxide antireflection films in high-efficiency solar cells	ion engine
01 p0004 A74-14250	[AIAA PAPER 73-1113] 01 p0001 A74-10691 CARBON MOMOXIDE
APSIDES	Catalytic combustion of carbon monoride in
Effect of the sun, the moon and solar radiation pressure on a near-equatorial synchronous	qasoline engine exhaust using manganese catalysts
satellite	[AD-760395] 01 p0011 N74-10874 CATALYSTS
01 m0003 A74-13559	Catalytic combustion of carbon monoride in
ARC HEATING Heating of a substance by an arc plasma	gasoline engine exhaust using manganese catalysts
01 p0001 A74-10463	[AD-760395] 01 p0011 N74-10874 Substitute catalysts for platinum in automobile
ARGON PLASMA	emission control devices and petroleum refining
Characteristics of a nonequilibrium MHD generator 01 p0005 A74-17439	[PB-222167/9] 01 p0018 N74-11941
ATTITUDE CONTROL	CATALYTIC ACTIVITY The refining of turbine fuels by modern
Photosensitive elements for solar sensors	hydrotreating
AUTOBOBILE REGINES 01 p0005 A74-17296	[AIAA PAPER 74-162] 01 p0006 174-18798 CERANICS
The association of automotive fuel composition	Exploratory development of a glass ceramic
with exhaust reactivity [PB-222609/0] 01 p0010 N74-10129	automobile thermal reactor anti-pollution
Vapor generator feed pump for Rankine cycle	devices [NASA-CR-134531] 01 p0019 N74-12447
automotive propulsion system (Chandler Evans)	CESIUM DIODES
[PB-222849/2] 01 p0011 N74-10747	Thermionic energy conversion. Volume I - Processes
Electric wehicle battery research and development	and devices Book 01 p0004 A74-14327
[NASA-TM-X-71471] 01 p0012 N74-10946 Substitute catalysts for platinum in automobile	CHANNEL FLOW
emission control devices and petroleum refining	Qualitative analysis of the efficiency of NHD energy conversion
IPB=222167/91 01 50019 N7/L-11061	01 p0003 174-13944
Exploratory development of a glass ceramic automobile thermal reactor anti-pollution	CHEMICAL AWALTSIS
devices	Aviation turbine fuels, 1972 01 p0014 N74-11592
(NASA-CR-134531) 01 p0019 N74-12447 AUXILIARY POWER SOURCES	CIVIL AVIATION
Investigation of chemical APO application for	Aviation needs and public concerns civil
small drowing bower sources	aviation growth in Europe and environmental control
fAD-765724] 01 p0009 N74-10082 Air mobility fuel cell study desulfurization	01 p0027 N74-14749
of JP-4 fuel	COAL Study of application of approximation of approximation of application of application of approximation o
[AD-766757] 01 p0022 H74-12742	Study of application of ERTS-A imagery to fracture-related mine safety hazards in the coal
	mining industry Indiana
В	[E74-10083] 01 p0014 N74-11195 Directional properties of coal and their
BALLOON FLIGHT	utilization in underground gasification
Study of fuel cell system for powered balloon reusable powerplants	experiments
[AD-766253] 01 p0009 N74-10083	[BM-TPR-73] 01 p0018 N74-12159 Coal
BALLOOMS	01 p0028 N74-15230
Solid state hydrogen gas generator rocket deployed balloons inflation	Factors affecting the use of coal in present and
[AIAA PAPER 73-1232] 01 p0001 a74-11257	future energy makers background paper for Congressional investigation of earth resources
BIBLIGGRAPHIES	and energy policies
Energy: Compiled bibliography and tables of world resources, consumption, and wastes	01 p0031 N74-15684
14RP=63/731 01 m0040 x70 40004	
Energy F and D inventory data base. Bibliography, 1973	

01 p0017 N74-11849

COLORADO	Energy research and development: An overview of
FRYS-1 imagery use in reconnaissance prospecting:	our mational effort 01 p0016 N74-1178B
Evaluation of the connercial utility of ERTS-1 imagery in structural reconnaissance for	University energy research centers 01 p0019 N74-12668
minerals and petroleum interpretation or	Phoray facts
Colorado region [E74-10007]	01 p0020 N/4-126/2
COMBUSTION CHAMBERS	The Federal Government and energy: R and D historical background
Combustion of the gases methane, LP gas and ammonia in a mixing reactor air pollution	01 p0021 N/4-1268/
control device	An inventory of energy research, volume 1 01 p0021 H74-12688
[FOA-1-C-1442-H3] 01 p0022 N74-12824	An inventory of energy research, volume 2
COMBUSTION EFFICIENCY The hydrogen fuel economy and mircraft propulsion	01 p0021 #74-12005
(ATAA PAPER 73-1319) 01 p0006 A74-17905 Low energy gas utilization in combustion gas turbine	Short term energy shortages 01 p0021 N74-12690
07 p0029 N74- (344)	Energy research and development and space technology 01 p0022 N74-12691
COMBUSTION PRODUCTS Conversion of fuel mitrogen to NOx in a compact	RPA pollution regulations and fuel shortage: The
combustor	impact on mass transit 01 p0027 N74-14690
[ASME PAPER 73-WA/GT-2] 01 p0002 A74-13293 COMMERCIAL AIRCRAFT	Proper crisis and small business Federal Trade
The technology and economics of commercial	Commission report on investigation of petroleum industry
airplane design. I 01 p0001 174-10144	01 p0027 N74-14691
COMMUTATION	Energy research and development, 2 01 p0027 N74-14692
Possibility of commutating thermoelectric batteries with the aid of mercury amalgam	National Fuels and Energy Conservation Act of 1973
[AD-75606B] 01 p0010 N/4-10084	[S-REPT-93-526] 01 p0027 N/4-14693 Legislative authority of Federal agencies with
COMPOSITE MATERIALS Matrices for E3P04 fuel cells	recreet to fuels and energy: A Stall dudly515
[AD-766312] 01 p0010 N74-10086	01 p0031 N74-15686 The President's energy message and S. 1570
COMPUTER PROGRAMMING Calculations on a solar energy system for	. U1 b0031 N/4=1388/
electric power and heat generation in buildings	Summary of the energy conservation and development
[LBL-1773] 01 p0023 N74-13530	recommendations contained in the final report of the National Commission on Materials Policy,
COMPUTER PROGRAMS Manergy: An energy management model of the United	June 1973: A background paper 01 p0031 N74-15688
States for the prediction of energy demand.	Energy conservation, part 1
resource consumption, environmental effects, the assessment of new technology, and energy	04 P001 -1/4 LE00d 10
resource alternatives	COMSERVATION National energy policy
O1 p0026 N74-14665	01 00021 174-12681
Trends in the mechanization of the coal industry	Federal energy conservation Pederal policy on conservation and reduction of energy requirements
and guarantee of patent-ability of designs that are competitive on the world technological level	01 p0026 N74-14687
computerized data retrieval system for	CONSUMPTION Energy: Compiled bibliography and tables of world
development of hydraulic equipment 01 p0016 N74-11759	resources, consumption, and wastes
CONCRNTRATORS	[LRP-63/73] U1 puoto #74-10391
Theoretical performance of cylindrical parabolic	CONTROL EQUIPMENT Substitute catalysts for platinum in automobile
solar concentrators 01 p0001 A74-10026	emission control devices and petroleum relining
COMPERENCES	[PB-222167/9] 01 public N74-1134; Present air pollution situation in Kawasaki city
Cryoqenic Engineering Conference, University of Colorado, Boulder, Colo., August 9-11, 1972,	and future countermeasures
Proceedings 01 p0003 A74-14043	[KS-27] 01 p0018 N74-12321
The second fifteen years in space; Proceedings of	A novel method of cooling semiconductor devices
the Bleventh Goddard Memorial Symposium,	for power electronics [BBFT-PB-T-73-02] 01 p0015 N74-11739
Washington, D.C., March 8, 9, 1973 01 p0004 A74-14463	Proceedings of the Solar Heating and Cooling for
TERRASTAR: Terrestrial application of solar	Buildings Workshop. Part 1: Technical sessions, March 21 and 22
technology and research [NASA-CR-129012] 01 p0020 N74-12674	[PB-223536/4GA] 01 p0025 N74-14499
Constant of university forms of the National	COST ANALYSIS The energy situation emphasizing various
Commission on Materials Policy, May - June 1972- A background document. NCMP forum on	energy sources, costs, and environmental effects
manhorical Innovation in the Production and	01 0016 074-11744
Utilization of Materials at Pennsylvania State University, on 19-21 June 1972	Energy in transportation energy costs of passenger and cargo transportation
rnn_001470/2611 01 D0025 N/4=14401	01 p0023 N74-13675 Boonomics of air transport direct and indirect
Compendium of University forums of the National Commission on Materials Policy, May - June 1972.	costs
a background document: University Forum on	[NASA-TT-F-15249] 01 p0026 p74-14682
National Materials Policy, Massachusetts Institute of Technology on 30 May - 2 June 1972	COVERINGS The use of FEP Teflon in solar cell cover technology
Institute of Technology on 30 Bay = 2 Sune 13/2 [PB-223678/4GA] 01 p0029 N74-15290	[NASA-TH-X-71485] 01 p0012 N74-10944
	CRUDE OIL Commerical petroleum products, properties and
CONCURSS Energy research and development and space technology 01 p0012 %74-10892	applications USSE petroleum industry handbook
Solar energy for the terrestrial generation of	[AD-754703] 01 p0010 N74-10128 Substitute catalysts for platinum in automobile
electricity 01 p0012 N74-10896	emission control devices and petroleum refining
Salar-energy for heating and cooling	
	[PB-222167/9] 01 p0018 N74-11941
01 p0016 N74-11787	[PB-222167/9] 01 p0018 N74-11941 Second iteration analysis of a fossil fuel-fired gas turbine-potassium-steam combined cycle [ORNI-NSP-RP-39] 01 p0019 N74-12577

CRIOGRAIC EQUIPMENT SUBJECT INDEX

Energy crisis and small business --- Federal Trade Oil and das Commission report on investigation of petroleum 01 p0029 N74-15250 industry Oil shale 01 D0027 N7#-1#601 01 p0029 N74-15260 Oil and gas Dos+ 01 p0029 x74-15259 O1 p0029 N74-15261
Compendium of University forums of the National
Commission on Materials Policy, May - June 1972.
A background document: University Forum on
National Materials Policy, Massachusetts
Institute of Technology on 30 May - 2 June 1972
[PB-223678/46] O1 p0029 N74-15290 01 p0029 N74-15261 011 chalo 01 p0029 N74-15260 Selected list of Bureau of Mines publications on petroleum and natural qas, 1961-1970 [BM-IC-8534] 01 p0032 N74-15691 CRYOGRNIC EQUIPMENT Cryogenic instrumentation at and above liquid Pactors affecting the use of coal in present and future energy makers --- background paper for Congressional investigation of earth resources bydrogen temperature - Present and future 01 p0003 A74-14057 CRYOGENIC FLUID STORAGE and energy policies Storage and transportation of synthetic fuels. A report to the synthetic fuels panel 01 p0031 N74-15688 The effect of fuel availability on future R and D programs in power generation [ORNL-TH-4307] 01 n0030 N74-15448 O1 p0031 N74-15689
Selected list of Eureau of Mines publications on
petroleum and natural gas, 1961-1970
[BM-IC-85341 CRYOGENIC PLUIDS Prospects for hydrogen as a fuel for transportation systems and for electrical power qeneration 01 p0032 N74-15691 [ORNL-TM-4305] 01 p0030 N74-15449 Outlook for energy in the United States to 1985 01 p0032 N78-15697 CRYOGENICS Cryogenic Engineering Conference, University of Colorado, Boulder, Colo., August 9-11, 1972, Residential energy use: An econometric analysis [R-1297-NSF] 01 p0032 N74-15698 Proceedings BCONONIC ANALYSIS 01 p0003 A74-14043 Energy research and development: An overview of our national effort 01 p0016 N74-11788 Mathematical methods of optimal planning DATA ACQUISITION development and use of energy systems Strip-mined watershed hydrologic data acquisition study --- remote infrared aerial photography [JPRS-60546] 01 p0022 N79-12693 ECONOMIC FACTORS [PB-223558/8GA] 01 p0025 N74-14105 The technology and economics of commercial DATA PROCESSING airplane design T Investigations using data in Alabama from BRTS-A 01 p0001 A74-10144 --- land use, mineral exploration, qeology, The case for hydrogen fueled transport aircraft hydrology, water resources, data processing, data management, marine environments
[E74-10124] 01 p0023 N74 [AIAA PAPER 73-1323] 01 p0002 A74-11315 ECONOMICS 01 p0023 N74-13051 Energy consumption and gross national product in DESHIPPRIZING the United States: An examination of a recent Air mobility fuel cell study --- desulfurization of JP-4 fuel [AD-766757] change in the relationship 01 p0030 N74-15681 01 p0022 N74-12742 ELECTRIC BATTERIES Hydrogen generator --- for hydrocarbon fueled fuel Electric vehicle battery research and development
[NASA-TH-X-71471] 01 p0012 N74-109
Si-Au Schottky barrier nuclear battery --- for cells [AD-767402] 01 p0012 N74-10946 01 p0024 N78-13766 DIRECT POWER GENERATORS medical applications The synchronous BFD device [TID-26342] 01 p0017 N74-11851 01 p0024 N74-13759 BLECTRIC CONDUCTORS MHD for power generation: The view of a chosen few Present state of the art in conductive coating [AD-760342] 01 p0025 N74-14408 technology DISTILLATION 01 p0006 A74-17654 Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues
[DFVLR-SONDDR-301] 01 p3006 a74-18 Possibility of commutating thermoelectric batteries with the aid of mercury analyam 01 p0006 A74-18925 [AD-75606B] 01 p0010 N74-10084 Experimental two-phase liquid-metal magnetohydrodynamic generator program E [AD-766588] 01 p0013 N74-10952 EARTH RESOURCES ELECTRIC ENERGY STORAGE Quantification of the luminescence intensity of Chemical storage of hydrogen in Ni/H2 cells 01 p0004 A74-14248 01 p0005 A74-14892 ELECTRIC GENERATORS Energy: Compiled bibliography and tables of world High voltage solar cell power generating system resources, consumption, and wastes for regulated solar array development (AIAA PAPER 73-1105) 01 p0 [LRP-63/73] 01 p0010 N74-10391 01 p0002 A74-12242 The Federal Government and energy: R and D ELECTRIC WETWORKS historical background Experimental determination of dynamic 01 p0021 N74-12687 characteristics of hydrogen oxygen fuel cell Some interfaces in resource utilization --- power systems source from earth crust heat [LA-UR-73-570] 01 b0009 N74-10074 01 p0022 N74-12696 [LA-UR-13-570] Compendium of university forums of the National Commission on Materials Policy, May - June 1972. A background document. NCMP forum on Technological Innovation in the Production and Utilization of Materials at Pennsylvania State ELECTRIC POTENTIAL Present state of the art in conductive coating technology 01 p0006 174-17654 ELECTRIC POWER Solar power generation and distribution Oniversity, on 19-21 June 1972 [PB-223679/2GA] 01 p0021 N74-12680 01 p0025 N74-14251 Review of world energy supplies --- reserves and resources of fossil and fissile fuels
[IGU/A-1-73] 01 p0026 N74-14666 Energy and the environment: Electric power [PB-223326/061] 01 p0028 [PB-223326/0G] 01 p0028 #74-14791 Prospects for hydrogen as a fuel for transportation systems and for electrical power Nuclear fuels: Uranium generation 01 p0028 N74-15257 [ORNL-TH-4305] 01 p0030 N74-15449 Nuclear fuels: Thorium Residential energy use: An econometric analysis
[R-1297-NSF] 01 p0032 N74-15698 01 p0029 N74-15258

SUBJECT INDEX BRERGY CONVERSION

ELECTRIC POWER PLANTS Regional and global energy transfer via passive	Research on electrochemical energy conversion systems electrolytes for hydrocarbon-air
power relay satellites 01 p0005 174-16116	fuel cells [AD-766329] 01 p0013 N74-10951
Closed cycle MHD for central station power with fossil or nuclear fuels	RECETTON EMISSION Recent developments in the field of thermionic
[AD-766500] 01 p0012 N74-10949	power conversion and its possible effects on
Development of geothermal reservoirs from	power supply systems in space and on earth FDGLR PAPER 73-0921 01 p0005 A74-17195
over-pressured areas beneath the Gulf coastal	[DGLR PAPER 73-092] 01 p0005 A74-17195 BLECTRON MICROSCOPES
plain of Texas. A feasibility study of power	Mass transfer in fuel cells electron
production from overpressured reservoirs (AD-766855] 01 p0018 N74-12183	microscopy of components, thermal decomposition
Liquid metal magnetohydrodynamics (LMMHD)	of Teflon, water transport, and surface tension
technology transfer feasibility study. Volume	of KOH solutions
1: Summary	[NASA-CR-134519] 01 p0009 N74-10075
[NASA-CR-136197] 01 p0023 N74-13466	RNERGY BUDGETS
Liquid metal magnetohydrodynamics (LMMHD)	The energy dilemma and its impact on air
technology transfer feasibility study. Volume	transportation
2: Appendires	[NASA-CR-135993] 01 p0015 N74-11743
[NASA-CR-136198] 01 p0023 N74-13467	The air transportation/energy system
BLECTRIC POWER SUPPLIES	01 p0016 N74-11745
Spacecraft electrical power solar cells and	Energy conservation and air transportation
storage batteries	01 p0016 N74-11746
01 p0002 A74-12201	Conclusions and recommendations for problems
Thermoelectric generators radio relay station	in energy situation, air transportation, and hydrogen fuel
power supply application 01 p0002 A74-13448	01 p0016 N74-11748
Power conditioning system for FAA Air Route	EMERGY CONVERSION
Traffic Control Centers	Thermionic energy conversion. Volume I - Processes
01 p0004 A74-14133	and devices Book
Magnetohydrodynamic method of obtaining electrical	01 p0004 A74-14327
energy (collected articles)	Evolution of studies in the field of gas lasers
[AD-765933] 01 p0011 N74-1068)	01 p0005 A74-16909
Blectric vehicle battery research and development	Recent developments in the field of thermionic
[NASA-TH-X-71471] 01 p0012 N74-10946	power conversion and its possible effects on
A novel method of cooling semiconductor devices	power supply systems in space and on earth
for power electronics	[DGLE PAPER 73-092] 01 p0005 A74-17195
[BMFT-FB-T-73-02] 01 p0015 N74-11739	Energy supply and energy transformers in
Development of design criteria, cost estimates,	satellites and spacecraft
and schedules for an MHD high performance	01 p0006 A74-18189
demonstration experiment	Solar energy to meet the nation's energy needs [NASA-TH-I-68290] 01 p0011 N74-10754
[AD-766232] 01 p0017 N74-11852 Alternative energy sources: A research challenge	Solar energy for the terrestrial generation of
[CONF-730560-1] 01 p0024 N74-14097	electricity
ELECTRIC POWER TRANSHISSION	01 p0012 N74-10896
Power source quality consequence and cures of	Solar-energy for heating and cooling
source deficiencies in quality of ac electric	01 p0016 N74-11787
power service	Energy demand and its effect on the ennvironment
01 p0019 N74-12635	[2-5048] 01 p0017 N74-11790
ELECTRICAL PROPERTIES	The U.S. energy problem. Volume 2: Appendices,
Thermoelectric generators radio relay station	part B to include development of alternate
power supply application	power sources to reduce fossil fuel consumption
01 p0002 A74-1344B	[PB=207519] 01 p0017 N74-11796
Experimental determination of dynamic	An assessment of solar energy as a national energy resource
characteristics of hydrogen oxygen fuel cell	[NASA-CR-136191] 01 p0019 N74-12462
systems 01 p0009 N74-10074	Energy facts
BLECTRICITY	01 p0020 N74-12672
Solar ponds extended	Energy consumption: Past, present, future
[UCID-16317] 01 p0023 N74-13537	01 p0020 N74-12675
Electric energy requirements for environmental	Energy and resource consumption
protection	01 p0020 N74-12676
[CONF-730205-4] 01 p0027 N74-14695	Znergy resources
ELECTRO-OPTICS	01 p0020 N74-12677
Investigation of silicon photoelectric cells as	Components for solar energy
precision photodetectors electro-optical	01 p0020 N74-12678
properties of silicon solar cells	Solar power generation and distribution
[NRC-TT-1686] 01 p0010 N74-10199	01 p0021 N74-12680
BLECTROCHEMICAL CELLS	National energy policy
Chemical storage of hydrogen in Ni/H2 cells	01 p0021 N74-12681 Solar energy potential
01 p0004 A74-14248 ELECTROHYDRODYNAMICS	01 p0021 N74-12682
On the theory of alternating-current	Impacts of solar energy utilization
electrofluiddynamic converters	01 p0021 N74-12683
01 p0007 A74-18988	Strategy for solar heating and cooling in buildings
The synchronous EFD device	01 p0021 N74-12685
01 p0024 N74-13759	An inventory of energy research, volume 1
ELECTROLYTES	01 p0021 x74-12688
Experimental determination of dynamic	Energy research and development: A selected
characteristics of hydrogen oxygen fuel cell	reading list
systems	[ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695
01 p0009 N74-10074	Isotope kilowatt program
Electrolyte for hydrocarbon air fuel cells	[ORNL-TH-4243] 01 p0025 N74-14377
(AD-766313] 01 p0010 N74-10085	Energy conservation through effective utilization
Properties of solid polymer electrolyte	[NBSIR-73-102] 01 p0027 N74-14688
fluorocarbon film used in hydrogen/oxygen	National Fuels and Energy Conservation Act of 1973
fuel cells [NASA-TN-D-7482] 01 p0011 N74-10547	[S-REPT-93-526] 01 p0027 N74-14693
[NASA-TN-D-7482] 01 p0011 N74-10547	

01 p0030 N74-15667

01 p0030 N74-15679

01 p0030 N74-156B1

01 p0031 N74-15684

01 p0031 N74-15685

01 p0031 N74-15688

```
Storage and transportation of synthetic fuels. a report to the synthetic fuels panel [ORNL-TM-4307] 01 p0030 N74-15448
                                                                                  Time factors in slowing down the rate of growth of
                                                                                     demand for primary energy in the United States
                                                                                     [EOL-71
     The energy situation in the community, situation
                                                                                  The energy situation in the community, situation
       1972, forecasts 1973
                                                                                     1972, forecasts 1973
                                               01 p0030 N74-15679
    Energy resources of the United States --- based on
                                                                                  Individual action for energy conservation
       qeological survey of all available sources of
                                                                                  O1 p0030 N74-15680 Energy consumption and gross national product in
       energy
       [CIRC-6501
                                               01 p0031 N74-15685
                                                                                     the United States: An examination of a recent
    The effect of fuel availability on future R and D programs in power generation
                                                                                     change in the relationship
                                                                                  Conservation and efficient use of energy, part 1 01 p0030 N74-15682
                                               01 p0031 N74-15689
    Energy, resources and the environment [M72-180-REV-1] 01 c
                                               01 p0032 N74-15695
                                                                                  Factors affecting the use of coal in present and
    Outlook for energy in the United States to 1985
01 p0032 N74-15697
                                                                                    future energy makers --- background paper for Congressional investigation of earth resources
ENERGY CONVERSION EFFICIENCY
                                                                                     and energy policies
    Heating of a substance by an arc plasma
                                              01 p0001 A74-10463
                                                                                  Energy resources of the United States --- based on geological survey of all available sources of
    Qualitative analysis of the efficiency of MHD
       energy conversion
                                                                                    energy
                                              01 p0003 A74-13944
                                                                                    [CIRC-650]
    Vitreous oxide antireflection films in
                                                                                  Legislative authority of Federal agencies with
      high-efficiency solar cells
                                                                                    respect to fuels and energy: A staff analysis
01 p0031 N74-15686
                                              01 p0004 A74-14250
    On the theory of alternating-current
                                                                                  The President's energy message and S. 1570
      electrofluiddynamic converters
                                                                                                                            01 p0031 N74-15687
                                              01 p0007 A74-18988
                                                                                  Summary of the energy conservation and development recommendations contained in the final report of
    Research on electrochemical energy conversion
      systems --- electrolytes for hydrocarbon-air
                                                                                    the National Commission on Materials Policy,
June 1973: A background paper
      fuel cells
      [AD-766329]
                                              01 p0013 N74-10951
   Solar heat utilization in residential heating
                                                                                  Energy conservation, part 1
      systems
                                                                                                                            01 p0031 N74-15690
                                              01 p0019 N74-12664
                                                                                 Energy, resources and the environment
ENERGY POLICY
                                                                                                                            01 p0032 N74-15695
   Report to the president and to the council on
                                                                                 Outlook for energy in the United States to 1985
      environmental quality
                                                                                                                            01 p0032 N74-15697
                                              01 p0024 N74-14094
                                                                             ENERGY REQUIREMENTS
   Proceedings of the Solar Beating and Cooling for
                                                                                 Solar power for our nation
      Buildings Workshop, Part 1: Technical sessions, Harch 21 and 22
                                                                                                                            01 p0004 174-14465
                                                                                 Energy: Compiled bibliography and tables of world
      FPB-223536/4GA1
   [PB-223536/4GA] 01 p0025 N74-14499
Manergy: An energy management model of the United
States for the prediction of energy demand,
                                                                                   resources, consumption, and wastes [LRP-63/73]
                                                                                                                            01 p0010 n74-10391
                                                                                 Energy research and development and space technology
01 p0012 N74-10892
     resource consumption, environmental effects, the assessment of new technology, and energy
                                                                                 A hydrogen energy carrier. Volume 1: Summary ---
                                                                                   hydrogen energy carriers.

for meeting energy requirements

01 p0016 N74-11727
     resource alternatives
                                             01 p0026 N74-14665
   Review of world energy supplies --- reserves and
                                                                                 A hydrogen energy carrier. Volume 2: Systems
     resources of fossil and fissile fuels
                                                                                   analysis
     [IGU/A-1-73]
                                             01 p0026 N74-14666
                                                                                   [NASA-CR-136007]
   Energy policy research and the State of Plorida
[P-5078]
                                                                                                                            01 p0014 N74-11728
                                                                                 Summary of systems analysis of hydrogen as an
                                             01 p0026 N74-14684
                                                                                   energy carrier in the United States
   Federal agency energy conservation
                                                                                                                            01 p0015 N74-11729
                                             01 p0026 N74-14686
   Pederal energy conservation --- Pederal policy on conservation and reduction of energy requirements
                                                                                 Current energy shortage in the United States
                                                                                                                            01 p0015 N74-11730
                                                                                 Production of hydrogen --- for hydrogen economy
                                             01 p0026 N74-14687
   Energy conservation through effective utilization
                                                                                                                           01 p0015 N74-11731
                                                                                Implementation of a hydrogen energy carrier system 01 p0015 M74-11735
     [NBSIR-73-102]
                                             01 p0027 N74-14688
   EPA pollution regulations and fuel shortage: The
                                                                                 Energy research and development: An overview of
     impact on mass transit
                                                                                   our national effort
  Energy crisis and small business --- Federal Trade
                                                                                                                            01 p0016 N74-11788
                                                                                Energy demand and its effect on the ennvironment [P-5048] 01 p0017 N74-11790
     Commission report on investigation of petroleum
  Energy research and development, 2
01 p0027 N74-14692
                                                                                 Energy trends and their future effects upon
                                                                                Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses [P-5046]

The U.S. energy problem. Volume 2: Appendices, part A --- to include alternate energy sources for fossil fuels

[P-207610]

O1 20017 974-11795
  National Fuels and Energy Conservation Act of 1973 [S-REPT-93-526] 01 p0027 R74-14693
  Electric energy requirements for environmental
     protection
     CONF-730205-4 ]
                                                                                   [PB-207518]
                                                                                                                           01 p0017 N74-11795
                                             01 p0027 N74-14695
                                                                                The U.S. energy problem. Volume 2: Appendices, part B --- to include development of alternate
  Energy and the environment: Electric power
  [PB-223326/QGA] 01 p0028 N7/
Energy situation and nuclear power --- global
applications of nuclear reactors
                                            01 p0028 N74-14791
                                                                                   power sources to reduce fossil fuel consumption
                                                                                  [PB-207519]
                                                                                                                           01 p0017 x74-11796
                                                                                Energy R and D inventory data base. Bibliography,
                                            01 p0029 N74-15391
  Storage and transportation of synthetic fuels.
    report to the synthetic fuels panel
                                                                                                                           01 p0017 N74-11849
     [ORNL-TM-4307]
                                                                                Energy facts
                                             01 p0030 N74-15448
  Prospects for hydrogen as a fuel for transportation systems and for electrical power
                                                                                                                           01 p0020 N74-12672
                                                                               TERRASTAR: Terrestrial apprint technology and research [NASA-CR-129012] 01 p0020 N74-12674 Energy consumption: Past, present, future 01 p0020 N74-12675
                                                                                TERRASTAR: Terrestrial application of solar
     generation
    [ORNL-TM-4305]
                                            01 p0030 N74-15449
```

SUBJECT INDEX

Solar energy to meet the nation's energy needs

[NaSa-TM-X-68290] 01 p0011 N74-10754 Energy and resource consumption f NASA-TM-X-682901 01 p0020 N74-12676 Energy research and development and space technology Energy resources 01 p0012 N74-10892 01 n0020 N74-12677 A hydrogen energy carrier. Volume 1: Summary ---Solar heating and cooling buildings for meeting energy requirements 01 n0020 N74-12679 01 p0014 N74-11727 [NA SA-CR-135995] National energy policy A hydrogen energy carrier. Volume 2: Systems 01 p0021 N74-12681 analysis Solar energy notontial 01 p0014 N74-11728 [NASA-CR-136007] 01 p0021 N74-12682 Summary of systems analysis of hydrogen as an Impacts of solar energy utilization energy carrier in the United States 01 p0021 N74-12683 01 p0015 N74-11729 Market potential for solar heating and cooling in Current energy shortage in the United States
01 m0015 N74-11730 01 p0021 N74-12684 Production of hydrogen --- for hydrogen economy An inventory of energy research, volume 1 01 p0015 N74-11731 01 p0021 N74-12688 Transmission and storage of hydrogen Short term energy shortages 01 p0015 N74-11732 01 p0021 N74-12690 Safety, legal, environmental, economic, political, Energy research and development and space technology 01 p0022 N74-12691 and social aspects of hydrogen 01 n0015 N74-11730 Energy research and development: A selected Implementation of a hydrogen energy carrier system reading list
[ORNL-EIS-73-65-REV-1] 01 p0015 N74-11735 01 n0022 N74-12695 The energy situation --- emphasizing various Solar ponds extended energy sources, costs, and environmental effects 01 p0016 N74-11744 FUCID-163171 01 D0023 N74-13537 Alternative energy sources: A research challenge Energy research and development: An overview of 01 p0024 N74-14097 CONF-730560-11 our national effort Manerqy: An energy management model of the United 01 p0016 N74-11788 States for the prediction of energy demand, resource consumption, environmental effects, the assessment of new technology, and energy Energy demand and its effect on the ennyicoment [P-5048] 01 p0017 N74-11790 Energy trends and their future effects upon resource alternatives transportation --- applied to rail, truck, and air cargo operations and private energy uses [P-5046]

The U.S. energy problem. Yolume 2: Appendices, part A --- to include alternate energy sources for fossil fuels 01 p0026 N74-14665 Energy policy research and the State of Plorida 01 p0026 N74-14684 FP-50781 Pederal agency energy conservation 01 p0026 N74-14686 f 08-11 - Federal policy on Federal energy conservation -01 p0017 N74-11795 (PB-2075181 conservation and reduction of energy requirements The U.S. energy problem. Volume 2: Appendices, part B --- to include development of alternate 01 p0026 N74-14687 Energy conservation through effective utilization power sources to reduce fossil fuel consumption f NBSIR-73-1021 01 p0027 N74-14688 01 p0017 N74-11796 [PB-207519] National Puels and Energy Conservation Act of 1973 [S-EPPT-93-526] 01 p0027 N74-14693 An assessment of solar energy as a national energy [S-REPT-93-526] Electric energy requirements for environmental resource 01 p0019 N74-12462 [NASA-CR- 136191] protection Solar heat utilization in residential heating 01 p0027 N74-14695 [CONF-730205-4] Time factors in slowing down the rate of growth of systems 01 D0019 N74-12664 demand for primary energy in the United States 01 p0030 N74-15667 Energy facts [EQL-71 01 p0020 N74-12672 energy situation in the community, situation TERRASTAR: Terrestrial application of solar 1972, forecasts 1973 technology and research 01 p0030 N74-15679 Energy consumption and gross national product in the United States: An examination of a recent change in the relationship 01 p0020 N74-12674 Energy consumption: Past, present, future 01 p0020 N74-12675 Pherov and resource consumption 01 p0030 N74-15681 01 p0020 N74-12676 Conservation and efficient use of energy, part 1 01 p0030 974-15682 Rnergy resources 01 p0020 N74-12677 Legislative authority of Federal agencies with Components for solar energy respect to fuels and energy: A staff analysis 01 p0031 N74-15686 01 00020 874-12678 The President's energy message and S. National energy policy 1570 01 p0021 N74-12681 01 p0031 N74-15687 Impacts of solar energy utilization Summary of the energy conservation and development 01 p0021 N74-12683 recommendations contained in the final report of the National Commission on Materials Policy, Market potential for solar heating and cooling in buildings June 1973: A background paper 01 p0021 N74-12684 01 p0031 N74-15688 Strategy for solar heating and cooling in buildings 01 p0021 874-12685 The effect of fuel availability on future R and D programs in power deneration The Federal Government and energy: R and D 01 p0031 N74-15689 historical background Energy conservation, part 1 01 p0021 N74-12687 01 p0031 N74-15690 Energy, resources and the environment
[272-180-REV-1] 01 An inventory of energy research, volume 1 01 p0021 N74-12688 01 p0032 N74-15695 Outlook for energy in the United States to 1985 01 p0032 N74-15697 An inventory of energy research, volume 2 01 p0021 N74-12689 Residential energy use: An econometric analysis Mathematical methods of optimal planning development and use of energy systems 01 p0032 N74-15698 [R-1297-NSF] [JPRS-60546] 01 p0022 N74-12693 BHERGY SOURCES Energy research and development: A selected Gas generators - A perspective --- alternative energy sources comparison reading list
[ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 [AIAA PAPER 73-1168] 01 p0001 A74-11219 Report to the president and to the council on Energy supply and energy transformers in satellites and spacecraft environmental quality 01 p0024 N74-14094 01 p0006 A74-18189

ENERGY STORAGE SUBJECT INDEX

```
Alternative energy sources: A research challenge
                                                                           ENGINE DESIGN
    [CONF-730560-1] 01 p0024 874-14097
Manerqy: An energy management model of the United
States for the prediction of energy demand,
resource consumption, environmental effects, the
                                                                              The jet engine design that can drastically reduce
                                                                                 oxides of nitrogen
                                                                                 [AIAA PAPER 74-160]
                                                                                                                       01 00006 174-18797
                                                                           PHETER MOTER
       assessment of new technology, and energy
                                                                              Refan program
                                                                                                 Phase 1: Summary report
       resource alternatives
                                                                                [NASA-TM-X-71456]
                                                                                                                       01 p0009 N74-10043
                                             01 p0026 N74-14665
                                                                           ENGINEERING NAWAGEMENT
    Review of world energy supplies ---
                                              reserves and
                                                                              Mathematical methods of optimal planning
      resources of fossil and fissile fuels
                                                                                 development and use of energy systems
                                             01 p0026 N74-14666
                                                                                 [JPRS-60546]
                                                                                                                       01 p0022 N74-12693
    Emergy policy research and the State of Florida
                                                                           ENTHALPY
      FP-50781
                                             01 p0026 N74-14684
                                                                              Investigation of a non-equilibrium NHD generator
    Federal agency energy conservation
                                                                                [AD-7664931
                                                                                                                       01 p0013 N74-10950
      [ OR-1 ]
                                             01 p0026 N74-14686
                                                                           ENVIRONMENT EFFECTS
    Energy conservation through effective utilization
                                                                              hpplications of meteorology to natural resource planning --- agriculture, forestry, energy, and
      [NBSIR-73-102]
                                             01 p0027 N74-14688
    EPA pollution regulations and fuel shortage: The
                                                                                 recreation
      impact on mass transit
                                                                                                                       01 p0014 N74-11395
                                             01 n0027 N74-14690
                                                                          ENVIRONMENT MANAGEMENT
    Bnergy research and development, 2
                                                                              Report to the president and to the council on environmental quality
                                             01 p0027 N74-14692
    National Fuels and Energy Conservation Act of 1973
[S-REPT-93-526] 01 p0027 N74-14693
                                                                                                                       01 p0024 N74-16096
                                                                          ENVIRONMENT MODELS
    Bitumen-bearing rocks --- as potential energy
                                                                              The 0.5. energy problem. Volume 2: Appendices, part B --- to include development of alternate
      sources
                                            01 n0028 N74-15226
                                                                                 power sources to reduce fossil fuel consumption
                                                                                ſ PB-2075191
                                                                                                                       01 p0017 N74-11796
                                            01 p0028 N74-15230
                                                                          ENVIRONMENT POLLUTION
    Geothermal resources --- exploitation for energy
                                                                              Energy and the environment: Electric power [PB-223326/06A] 01 p0028
       applications
                                                                                                                       01 p0028 N74-14791
                                            01 p0028 N74-15240
                                                                          ENVIRONMENT PROTECTION
    Energy situation and nuclear power --- global
                                                                              Report to the president and to the council on environmental quality
      applications of nuclear reactors
      [NP-19838]
                                            01 p0029 N74-15391
                                                                                                                       01 p0024 N74-14094
    Storage and transportation of synthetic fuels. A
                                                                              Electric energy requirements for environmental
      report to the synthetic fuels panel [ORNL-TM-4307]
                                                                                protection
                                           01 p0030 N74-15448
                                                                                CONF-730205-41
                                                                                                                      01 p0027 N74-14695
    Time factors in slowing down the rate of growth of
                                                                          ENVIRONMENTAL CONTROL
      demand for primary energy in the United States
                                                                              Aviation needs and public concerns --- civil
      [BQL-71
                                            01 p0030 N74-15667
                                                                                aviation growth in Europe and environmental
        energy situation in the community, situation
                                                                                control
      1972, forecasts 1973
                                                                                                                       01 p0027 N74-14749
                                            01 p0030 N74-15679
                                                                          ENVIRONMENTAL ENGINEERING
Present air pollution situation in Kawasaki city
    Conservation and efficient use of energy, part 1 01 p0030 N74-15682
                                                                                and future countermeasures
    Energy resources of the United States --- based on
                                                                          [KS-27]
ENVIRONMENTAL QUALITY
      geological survey of all available sources of
      energy
                                                                             Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin
      [CIRC-650]
                                            01 p0031 N74-15685
   Legislative authority of Federal agencies with respect to fuels and energy: 1 staff analysis 01 p0031 N74-15686
The President's energy message and S. 1570
                                                                                (resource inventory, land use, and pollution)
                                                                             [E74-10061] 01 p0013 N
The energy situation --- emphasizing various
                                                                                                                      01 p0013 N74-11182
                                                                                energy sources, costs, and environmental effects
01 p0016 N74-11744
                                            01 p0031 N74-15687
   Summary of the energy conservation and development recommendations contained in the final report of
                                                                              Research on the application of satellite remote
                                                                                sensing to local, state, regional, and national programs involved with resource management and
      the National Commission on Materials Policy,
      June 1973: A background paper
                                                                                environmental quality
                                            01 p0031 N74-15688
                                                                                [ NASA-CR-136472 1
                                                                                                                      01 p0024 N74-14093
   The effect of fuel availability on future R and D
                                                                          BTHANE
      programs in power generation
                                                                             Natural gas as an automotive fuel, an experimental
                                            01 p0031 N74-15689
                                                                                study
   Energy conservation, part 1
                                                                                [BM-RI-7806]
                                                                                                                      01 p0011 N74-10715
                                            01 p0031 x74-15690
                                                                          EUROPE
   Selected list of Bureau of Mines publications on
                                                                             Aviation needs and public concerns --- civil
      petroleum and natural gas, 1961-1970
                                                                                aviation growth in Europe and environmental
      [BM-IC-8534]
                                            01 p0032 N74-15691
                                                                                control
   Energy, resources and the environment
[M72-180-REV-1] 01:
                                                                                                                      01 n0027 k74-14749
                                            01 p0032 N74-15695
                                                                          EXHAUST GASES
   Outlook for energy in the United States to 1985
                                                                             The association of automotive fuel composition with exhaust reactivity
                                            01 p0032 N74-15697
   Residential energy use: An econometric analysis [R-1297-NSF] 01 p0032 N74-1
                                                                                [PB-222609/0]
                                                                                                                      01 p0010 N74-10129
                                            01 p0032 N74-15698
                                                                             Catalytic combustion of carbon monoxide in
ENERGY STORAGE
                                                                                gasoline engine exhaust using manganese catalysts
   Gas generators - A perspective --- alternative
                                                                                [AD-760395]
                                                                                                                      01 p0011 H74-10874
     energy sources comparison
                                                                             Emission calculations for a scramjet powered
      [ALAA PAPER 73-1168]
                                            01 m0001 A74-11219
                                                                             hypersonic transport
[NASA-TM-X-71464]
Exploratory development of a glass ceramic automobile thermal reactor --- anti-pollution
   Energy research and development and space technology
                                            01 p0012 N74-10892
   Transmission and storage of hydrogen
                                            01 p0015 N74-11732
                                                                                devices
ENERGY TRANSPER
                                                                                [NASA-CR-134531]
   Regional and global energy transfer via passive
                                                                             Effect of water injection on mitric oxide
      power relay satellites
                                                                                emissions of a gas turbine combustor burning
                                            01 p0005 A74-16116
                                                                                natural gas fuel
   Energy research and development and space technology
01 p0012 N74-10892
                                                                               [ NASA-TM-X-2959]
                                                                                                                     01 p0025 N74-14651
                                                                             Low energy das utilization in combustion das turbine 01 p0029 N74-15447
```

GAS FLOW SUBJECT INDEX

F	Research on electrochemical energy conversi- systems electrolytes for hydrocarbon-	on air
AIL-SAFE SYSTEMS	fuel cells [AD-766329] 01 p0013 Air mobility fuel cell study desulfuriz	N74-10951
Power conditioning system for FAA Air Route Traffic Control Centers	of JP-4 fuel	N74-12742
PASIBILITY ANALYSIS	The 1.5-kw fuel cell powerplant	N74-12744
Summary of the study of disposal of nuclear winto space	Hydrogen generator for hydrocarbon fuel	ed fuel
01 p0005 A7 Porecasting of technological progress for	[AD-767402] 01 p0024	N74-13766
long-range planning of mining operations at mines prediction analysis technique for	coal FUEL COMBUSTION Conversion of fuel nitrogen to NOx in a com combustor	pact
operational development 01 p0016 N7	_11765	A74-13293
PEDERAL BUDGETS Energy consumption and gross national product	The jet engine design that can drastically in orides of nitrogen	
the United States: An examination of a rec change in the relationship	nt [AIAA PAPER 74-160] (1 P0006 FORL CONSUMPTION	∆74-18797
01 p0030 N7	[P-5048] 01 p0017	N/4-11/90
Vapor denerator feed pump for Rankine cycle	Energy trends and their future effects upon transportation applied to rail, truck	. and
automotive propulsion system (Chandler Evan [PB-222849/2] 01 p0011 N7	-10747 air cargo operations and private energy u	ises
FIGURE OF BERIT Figure-of-merit calculation methods for organ	The U.S. energy problem. Volume 2: Append	N74-11791 lices,
heat-pipe fluids	part A to include alternate energy so	urces
[NASA-TH-X-2945] 01 p0015 N7 PISSIONABLE MATERIALS	rpa-2075181 01 p0017	N74-11795
Review of world energy supplies reserves	nd The U.S. energy problem. Volume 2: Append part B to include development of alte	ices. Trate
resources of fossil and fissile fuels [IGU/A-1-73] 01 p0026 N7	-14666 power sources to reduce fossil fuel consu	imption
FLAMMABLE GASES Natural gas as an automotive fuel, an experim	[15 44.5.1]	N74-11796
study	01 p0020	N74-12676
Selected list of Bureau of Mines publications	24 2025	N74-12677
petroleum and natural gas, 1961-1970 [BM-IC-8534] 01 p0032 N7	-15691 01 p0021	N74-12690
Residential energy use: An econometric analy [R-1297-NSP] 01 p0032 N7	-15698 passenger and cardo transportation	
FLUID RECHANICS Figure-of-merit calculation methods for organ	Time factors in slowing down the rate of gr	N74-13675
heat-pipe fluids	demand for primary energy in the United S	States N74-15667
[NASA-TH-X-2945] 01 p0015 N7 PLUOROCARBONS	Individual action for energy conservation	
Properties of solid polymer electrolyte fluorocarbon film used in hydrogen/oxyq	m Energy consumption and gross national produ	N74-15680
fuel cells [NASA-TN-D-7482] 01 p0011 N7	the United States: An examination of a r	ecent
POSSILS	01 p0030	N74-15681 R and D
Review of world energy supplies reserves resources of fossil and fissile fuels	programs in power generation	พ74-15689
[IGU/A-1-73] 01 p0026 N7 PRACTURING	Energy, resources and the environment	
Study of application of ERTS-A imagery to fracture-related mine safety bazards in the	• • • • • • • • • • • • • • • • • • •	N74-15695
mining industry Indiana	Electric vehicle battery research and devel	lopment N74-10946
[E74-10083] 01 p0014 N7 PRAUMHOFER LINE DISCRIMINATORS	FUEL TESTS	
Quantification of the luminescence intensity natural materials	f Low energy gas utilization in combustion qu 01 p0029	N74-15447
PREMCH SPACE PROGRAMS	-14892 YUEL-AIR RATIO Natural gas as an automotive fuel, an exper	cimental
Actual state of French technical developments	stud y	N74-10715
concerning sources of space power 01 p0002 A	1-12794 FOELS	
PREON Solar energy power system using freon	Substitute catalysts for platinum in automo emission control devices and petroleum re	efining
[NASA-CASE-NFS-21628-1] 01 p0025 N	(PB-222167/9] 01 p0018 University energy research centers	N74-11941
FURL CELLS Hass transfer in fuel cells electron	01 p0019	N74-12668
microscopy of components, thermal decomposion of Teflon, water transport, and surface terms.	tion resources of ideals and itselfe ideas	w74-14666
of KOH solutions [NASA-CR-134519] 01 p0009 N	∔−1 0075	
Study of fuel cell system for powered balloon reusable powerplants		
[AD-766253] 01 p0009 N Electrolyte for hydrocarbon air fuel cells	Significant research results for 1971, High	h _.
FRD=7663131 01 PUUIU N		ciences
Matrices for H3PO4 fuel cells [AD-766312] 01 p0010 N	4-10086 [AD-765753] 01 p0012	N74-10898
Properties of solid polymer electrolyte fluorocarbon film used in hydrogen/oxyc	GAS PLOW Qualitative analysis of the efficiency of	MHD
fuel cells	energy conversion	A74-13944
[NASA-TN-D-7482] 01 p0011 N	4-100+1 U1 p0000	_, , ,,,,,,

GAS GENERATORS SUBJECT INDEX

GAS GENERATORS		GERNANIUM ALLOYS	
Gas generators - A perspecti	ve alternative	State of developments and research problem	on the
energy sources comparison [AIAA PAPER 73-1168]	04 0004 - 50	Switching of Silicon dermanium allow	ou rue
Solid state hydrogen gas gen	01 p0001 A74-11219	thermoelectric elements	
deployed balloons inflation	statot tockét	[AD-765845] 01 p0009	N74-10080
[AIAA PAPER 73-1232]	01 p0001 A74-11257		
Hydrogen denerator for h	ydrocarbon fueled fuel	Exploratory development of a glass ceramic automobile thermal reactor anti-poll	;
cells		devices	.ution
[AD-767402]	01 p0024 N74-13766		N74-12447
GAS HEATING		GOLD	
Gas-heated 'heat pipe' vacuus	A furnace using	Si-Au Schottky barrier nuclear battery	for
thermionic energy conversion		medical applications	
GAS LASERS	01 p0007 A74-19724	[TID-26342] 01 p0017	N74-11851
Evolution of studies in the	field of das lasers	GOVERNMENTS	
	01 p0005 A74-16909	Federal agency energy conservation [OR-1] On pooce	
GAS MIXTORES		Federal energy conservation Federal po	N74-14686
Natural das as an automotive	fuel, as experimental	conservation and reduction of energy req	licy on
study		01 00026	N74-14687
[BM-RI-7806] GAS TURBINES	01 p0011 N74-10715	GROUND STATIONS	
	4-1-4-1	Power conditioning system for FAA air rout	e
Aviation gas turbine engines [AD-756810]	01 p0011 N74-10751	traffic control centers	
Second iteration analysis of	a fossil fuel-fired	01 p0019	N74-12636
gas turbine-potassium-steam	combined cycle		
ORNL-NSF-EP-391	01 n0019 N74-12577	Н	
Low energy gas utilization in	combustion gas turbine	HANDBOOKS	
	01 p0029 N74-15447	Commerical petroleum products, properties	and
GASOLINE		applications USSR petroleum industry	handhook
The association of automotive	fuel composition	[AD-754703] 01 p0010	N74-10128
with exhaust reactivity [PB-222609/0]	01 -0010 252 1010	HAKARDS	10120
GELS	01 p0010 k74-10129	Study of application of ERTS-A imagery to	
Aircraft fuel system tests wi	th delled	fracture-related mine safety hazards in t	the coal
fuel-flowmeter calibration,	fuel boost numn and	mining industry Indiana (E74-10083) 01 p001#	
jettison tests	TI TITLE WILL	HEAT PIPES 01 p0014	N74 -1119 5
[FAA-NA-73-43]	01 p0017 N74-11828	Development program for a liquid methane be	
GEOLOGICAL SURVEYS		01 00003	3 7 H= 10 OH 6
Nuclear fuels: Uranium		Gas-heated 'heat pipe' vacuum furnace p	8/47 14040
Nuclear fuels: Thorium	01 p0028 N74-15257	thermionic energy conversion	19114
Addied Ideis: INOTIUM	01 -0000 270 45050	01 p0007	A74-19724
Oil and gas	01 p0029 N74-15258	Figure-of-merit calculation methods for ord	janic
	01 p0029 N74-15259	heat-pipe fluids [NASA-TM-I-2945] 01 p0015	
Oil shale		A novel method of cooling semiconductor dev	N74-11736
*	01 p0029 N74-15260	for power electronics	/ices
Peat			N74-11739
GEOLOGY	01 p0029 N74-15261	HEAT TRANSFER	314 11733
Interdisciplinary application	e and intermediates	Heating of a substance by an arc plasma	
of ERTS data within the Sus	anchanna Piwas Basis	01 p0001	A74-10463
(resource inventory, land u	se, and nollution	Gas-heated 'heat pipe' vacuum furnace u	ising
[5/4-10061]	01 p0013 N78-11105	thermionic energy conversion	
Satellite geological and geop	hysical remote	01 p0007	A74-19724
sensing of iceland		Design considerations for the airframe-inte	grated
[E74-10073]	01 p0014 N74-11188	F ***	N74-12448
Investigations using data in	alabama from ERTS-A	Solar heat utilization in residential heati	BC 12470
land use, mineral explo- hydrology, water resources,	ration, geology,	systems	
data management, marine env	ironmonts	01 p0019	N74-12664
1 B /4-10124]	01 p0023 N74-13051	HEATING	
GEOPHYSICS		Proceedings of the Solar Heating and Coolin	q for
Satellite qeological and geopl	nysical remote	Buildings Workshop. Part 1: Technical sessions, March 21 and 22	
sensing of Iceland			N74-14499
(E74-10073)	01 p0014 N74-11188	HIGH TEMPERATURE RESEARCH	
GROTHERMAL ENERGY CONVERSION		Significant research results for 1971, High	
Some interfaces in resource no source from earth crust beat	:1112ation power	Temperature Institute, USSR Academy of Sc	iences
LA-OR-73-5701	01 50022 N70-12606	plasma physics and gas dynamics	
Assessment of geothermal energy	V POOZZ MIG-12696	[AD-765753] 01 p0012	N74-10898
	100011003 100011003 100011003	HIGH VOLTAGES	
GEOTHERNAL RESOURCES		Righ voltage solar cell power generating sy	stem
Development of geothernal rese	rvoirs from	for regulated solar array development [AIAA PAPER 73-1105] 01 p0002	- TA 42782
Over-pressured areas heneath	the Gulf general	The multiple junction edge illuminated solar	E/4-12644
Plain Of Texas. A feasibilit	TV C+ndV of nonen	[NASA=TR-X-77476] 01 n0012	N74-10947
production from overpressure [AD-766855]	d reservoirs	HISTORIES	
Solar energy potential	01 p0018 N74-12183	From scientific research to the atomic indu-	stry
	01 00021 970-12602	history of nuclear power industry	
Geothermal resources explo	01 p0021 N74-12682	[JPRS-60584] 01 p0023	N74-13428
applications	Tot outfill	SYDRAULIC EQUIPMENT	
100000000000000000000000000000000000000	01 p0028 N74-15240	Trends in the mechanization of the coal indi and quarantee of patent-ability of design:	astry
Assessment of qeothermal energ	7 resources	are competitive on the world technological	s that 1 level
	01 p0030 N74-15661	computerized data retrieval system for	L T TE4ET
		development of hydraulic equipment	-
		01 p0016 i	N74-11759

SUBJECT INDEX JET AIRCRAFT NOISE

HYDROCARBON PUELS	Interdisciplinary applications and interpretations
Supersonic fuels from medium oils produced by the	of ERTS data within the Susquehanna River Basin
thermal cracking of crude oil residues	(resource inventory, land use, and pollution)
[DFVLR-SONDDR-301] 01 p0006 174-18925	
Energy demand and its effect on the enhvironment	[E74-10061] 01 put 13 N/4-11182 Investigations using data in Alabama from ERTS-A
[P-5048] 01 p0017 N74-11790	land use, mineral exploration, qeology,
The U.S. energy problem. Volume 2: Appendices,	hydrology, water resources, data processing,
part A to include alternate energy sources	data management, marine environments
for fossil fuels	
[PB-207518] 01 p0017 N74-11795	£ 2 1 7 7 1 2 1
The U.S. energy problem. Volume 2: Appendices,	HYPERSONIC SPEED
part B to include development of alternate	Design considerations for the airframe-integrated
power sources to reduce fossil fuel consumption	scramjet NASA-TM-X-28951
[PB-207519] 01 p0017 N74-11796	(nava zu)
Combustion of the gases methane. LP gas and	HYPERSONIC VEHICLES
ammonia in a mixing reactor air pollution	Emission calculations for a scramjet powered
control device	hypersonic transport
[FOA-1-C-1442-H3] 01 p0022 N74-12824	[NASA-TH-X-71464] 01 p0018 N74-12445
0il and qas	
01 p0029 N74-15259	
Peat	·
01 p0029 N74-15261	ICELAND
HIDROCARBONS	Satellite geological and geophysical remote
Research on electrochemical energy conversion .	sensing of Iceland
systems electrolytes for hydrocarbon-air	[E74-10073] 01 p0014 N74-11188
fuel cells	INDEXES (DOCUMENTATION)
[AD-766329] 01 p0013 H74-10951	An inventory of energy research, volume 2
HYDROGES	01 p0021 N74-12689
Solid state hydrogen gas generator rocket	INDIANA
deployed balloons inflation	Study of application of ERTS-A imagery to
[AIAA PAPER 73-1232] 01 p0001 A74-11257	fracture-related mine safety hazards in the coal
A hydrogen energy carrier. Volume 1: Summary	mining industry Indiana
	[E74-10083] 01 p0014 N74-11195
for meeting energy requirements [NASA-CR-135995] 01 p0014 N74-11727	INDUSTRIAL PLANTS
	From scientific research to the atomic industry
A hydrogen energy carrier. Volume 2: Systems	history of nuclear power industry
analysis	[JPRS-60584] 01 p0023 N74-13428
[NASA-CR-136007] 01 p0014 N74-11728	INDUSTRIES
Summary of systems analysis of hydrogen as an	Commerical petroleum products, properties and
energy carrier in the United States	applications USSR petroleum industry handbook
01 p0015 N74-11729	[AD-754703] 01 p0010 N74-10128
Current energy shortage in the United States	Energy crisis and small business Federal Trade
01 p0015 N74-11730	Commission report on investigation of petroleum
Production of hydrogen for hydrogen economy	
01 p0015 N74-11731	industr y 01 p0027 N74-14691
Transpission and storage of hydrogen	INFORMATION RETRIEVAL
01 p0015 N74-11732	The history of technology and engineering solutions
Safety, legal, environmental, economic, political,	computerized data retrieval for coal mine
and social aspects of hydrogen	
01 p0015 N74-11734	planning 01 p0016 #74-11760
Implementation of a hydrogen energy carrier system	· · · · · · · · · · · · · · · · · · ·
01 p0015 N74-11735	INTERMETALLICS State of developments and research problem on the
Conclusions and recommendations for problems	
in energy situation, air transportation, and	switching of silicon germanium alloy
hydrogen fuel	thermoelectric elements [AD-765845] 01 p0009 N74-10080
01 p0016 N74-11748	(
Hydrogen generator for hydrocarbon fueled fuel	INTERNAL COMBUSTION ENGINES
cells	Natural gas as an automotive fuel, an experimental
[AD-767402] 01 p0024 N74-13766	study [BM-RI-7806] 01 p0011 N74-10715
Prospects for hydrogen as a fuel for	
transportation systems and for electrical power	Catalytic combustion of carbon monoxide in
qeneration	qasoline engine exhaust using manganese catalysts
[ORNL-TM-4305] 01 p0030 k74-15449	(AD-760395) 01 p0011 N74-10974
HIDROGEN FUELS	INTERNATIONAL COOPERATION
The case for hydrogen fueled transport aircraft	The energy situation in the community, situation
[AIAA PAPER 73-13231 01 p0002 A74-11315	1972, forecasts 1973
The hydrogen fuel economy and aircraft propulsion	01 p0030 N74-15679
rataa paper 73-13191 01 p0006 A74-17905	INTERNATIONAL LAW
The jet engine design that can drastically reduce	Legal considerations and constraints on US nuclear
oxides of mitrogen	policy
[AIAA PAPER 74-160] 01 p0006 A74-18797	[AD-754641] 01 p0024 N74-13697
An initial step: A demonstration project	ION ENGINES
promoting subsonic, hydrogen-fueled aircraft	Physical behaviour of some biowaste gases in an
01 p0016 N74-11747	ion engine
HYDROGEN OXYGEN FUEL CELLS	[AIAA PAPER 73-1113] 01 p0001 A74-10691
Experimental determination of dynamic	High voltage solar cell power generating system
characteristics of hydrogen oxygen fuel cell	for requiated solar array development
systems	[AIAA PAPER 73-1105] 01 p0002 A74-12242
01 p0009 N74-10074	•
HYDHOGENATION	J
The refining of turbine fuels by modern	_
hydrotreating	JAPAN
CATAR DARRER 74-1621 01 D0006 A74-18798	Present air pollution situation in Kawasaki city
supersonic fuels from medium oils produced by the	and future countermeasures
thermal cracking of crude oil residues	[KS-27] 01 p0018 N74-12321
[DFVLR-SONDDR-301] 01 p0006 A74-18925	JET AIRCRAFT NOISE
-	Performance and noise aspects of supersonic
	transport
	01 p0003 A74-13798

JET REGIER FUELS THESE PPPRCTS The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] 01 p0002 A74The refining of turbine fuels by modern Effect of the sun, the moon and solar radiation 01 p0002 A74-11315 pressure on a near-equatorial synchronous satellite hydrotreating 01 p0003 A74-1355q hydrotreating
[AINA PAPER 74-162] 01 p0006 A74-18
Supersonic fuels from medium oils produced by the 01 p0006 A74-18798 thermal cracking of crude oil residues
[DPVLR-SONDDR-301] 01 p006 01 p0006 174-18925 MAGNETOHIDRODYNAMIC GENERATORS Aviation turbing facile, 1972 Satellite nuclear power station: An engineering 01 50018 978-11603 JP-4 JRT FORL 01 p0002 A74-13234 Optimization of the power of Faraday HHD generators operating on nonequilibrium plasma Air mobility fuel cell study --- desulfurization of JP-4 fuel f AD-7667571 01 00022 974-12742 01 p0003 A74-13943 The 1.5-kW fuel cell powerplant Qualitative analysis of the efficiency of MHD f AD-7673021 01 p0022 N74-12744 energy conversion JUNCTION DIODES 01 p0003 A74-13944 The multiple junction edge illuminated solar cell [NASA-TM-X-714767 01 p0012 N74-10 Characteristics of a nonequilibrium MRD generator 01 p0012 N74-10947 01 p0005 A74-17439 Closed cycle MHD for central station power with fossil or nuclear fuels K FAD-7665001 01 p0012 N74-10989 KERACRYP Investigation of a non-equilibrium NHD generator FAD-766493] Conversion of fuel nitrogen to NOr in a compact 01 p0013 N74-10950 combustor Experimental two-phase liquid-metal [ASME PAPER 73-WA/GT-2] 01 n0002 174-13293 magnetohydrodynamic generator program [AD-766588] 01 p0013 N74-Development of design criteria, cost estimates, 01 p0013 N74-10952 and schedules for an MRD high performance LAND USE demonstration experiment Interdisciplinary applications and interpretations of ERTS data within the Susquehama River Basin (resource inventory, land use, and pollution) [E74-10061] 01 p0013 N74-11182 [AD-766232] Liquid metal magnetohydrodynamics (LMMBD) technology transfer feasibility study. 1: Summary [NASA-CR-136197] Investigations using data in Alabama from ERTS-A 01 p0023 N74-13466 -- land use, mineral exploration, qeology, Liquid metal magnetohydrodynamics (LMMHD) technology transfer feasibility study. Volume hydrology, water resources, data processing, data management, marine environments [874-10124] 2: Appendixes 01 p0023 n74-13051 I NASA-CR-136198] 01 p0023 N74-13467 LAW (JURISPHUDENCE) Impinging jet separators for liquid metal (GURLSPRUDENCE)

Legislative authority of Pederal agencies with
respect to fuels and energy: A staff analysis
01 p0031 N74-15686 magnetohydrodynamic power cycles [NASA-CR-136552] MAGNETOHYDRODYNAMIC WAYRS LIQUEPIED GASES Investigation of a non-equilibrium MHD generator [AD-766493] 01 p0013 N74-10 Development program for a liquid methane heat pipe 01 p0013 N74-10950 01 p0003 A74-14046 Prospects for hydrogen as a fuel for Magnetohydrodynamic method of obtaining electrical transportation systems and for electrical power energy (collected articles)
[AD-765933] qeneration 01 p0011 N74-10681 01 p0030 N74-15449 MHD for power generation: The view of a chosen few [AD-760342] 01 p0025 N74-14408 LIQUID HYDROGEN The case for hydrogen fueled transport aircraft MANAGEMENT METHODS [AIAA PAPER 73-1323] 01 p0002 A74-11315 Legislative authority of Federal agencies with Cryogenic instrumentation at and above liquid respect to fuels and energy: A staff analysis 01 p0031 N74-15686 hydrogen temperature - Present and future 01 p0003 A74-14057 Energy conservation, part 1 LIGHID METALS 01 p0031 N74-15690 Experimental two-phase liquid-metal magnetohydrodynamic generator program MANAGEMENT PLANNING Relevance of ERTS to the State of Ohio ---[AD-766588] Plevance of this to the state of state resources [E74-10024] 01 p0013 N74-11159 01 p0013 N74-10952 Liquid metal magnetohydrodynamics (LMMED) technology transfer feasibility study. Assessment of geothermal energy resources 1: Summary 01 p0030 N74-15661 [NASA-CR-136197] 01 p0023 N74-13466 MARINE ENVIRONMENTS Liquid metal magnetohydrodynamics (LMMHD) technology transfer feasibility study. Investigations using data in Alabama from ERTS-A --- land use, mineral exploration, qeology, bydrology, water resources, data processing, data management, marine environments [E74-10124] 01 p0023 N74 Volume 2: Appendires [NASA-CR-1361981 01 p0023 N74-13467 LIQUID OXYGEN 01 p0023 N74-13051 Cryoqenic instrumentation at and above liquid hydrogen temperature – Present and future Mass transfer in fuel cells --- electron 01 p0003 A74-14057 microscopy of components, thermal decomposition of Teflon, water transport, and surface tension LIQUID-GAS MIXTURES Impinging jet separators for liquid metal magnetohydrodynamic power cycles of KOH solutions [NASA-CR-134519] 01 p0009 N74-10075 [NASA-CR-136552] 01 p0027 N74-14785 MATERIALS HANDLING LOW COST ERRIALS HANDLING

Energy trends and their future effects upon
transportation --- applied to rail, truck, and
air cargo operations and private energy uses
[P-5046] 01 p0017 N74-11791 Individual action for energy conservation 01 p0030 N74-15680 LOW TEMPERATURE PHYSICS Cryoqenic Engineering Conference, University of MATHEMATICAL MODELS Colorado, Boulder, Colo., August 9-11, 1972, Mathematical methods of optimal planning development and use of energy systems Proceedings 01 p0003 A74-14043 [JPRS-60546]
MEASURING INSTRUMENTS 01 p0022 N74-12693 LUBRICANTS Aviation fuels and lubricants Cryogenic instrumentation at and above liquid 01 p0006 a74-18180

STRIRCT TENDY

SUBJECT INDEX NUCLEAR PHYSICS

MECHANICAL DELYES	MIERORS Refurbishment of solar simulation optical train
Current European developments in solar paddle drives 01 p0014 m74-11672	mirror assemblies
RECHABICAL BUGINEERING	(NASA-CR-134123] 01 p0018 W74-12016
Quarterly bulletin of the Division of Mechanical	N
Engineering and the National Aeronautical Establishment, 1 July - 30 September 1973	• • • • • • • • • • • • • • • • • • • •
reports on reynolds number effects, energy in	MASA PROGRAMS The second fifteen years in space: Proceedings of
transportation, and wave buoy accelerometer	the Eleventh Goddard Menorial Symposium,
[DHE/NAE-1973(3)] 01 p0023 874-13673 HERCURY ALLOYS	Washington, D.C., March 8, 9, 1973
Possibility of commutating thermoelectric	01 p0004 A74-14463
batteries with the aid of mercury amalgam [AD-756068] 01 p0010 #74-10084	FATURAL GAS Cryogenic instrumentation at and above liquid
[AD-756068] 01 p0010 874-10084 METAL HYDRIDES	hydrogen temperature - Present and future
Chemical storage of hydrogen in Ni/H2 cells	01 p0003 A74-14057
01 p0004 A74-14248	Oil and gas O1 p0029 N74-15259
MBTEOROLOGY Applications of meteorology to natural resource	BICKEL CADMIUM BATTERIES
planning agriculture, forestry, energy, and	Fabrication and testing of negative-limited sealed pickel-cadmium cells
recreation 01 p0014 N74-11395	[NASA-CH-135981] 01 p0009 N74-10078
METHANE	NTCKEL COMPOUNDS
Physical behaviour of some biowaste gases in an	Chemical storage of hydrogen in Ni/H2 cells 01 p0004 A74-14248
ion engine [AIAA PAPER 73-1113]	NICKEL PLATE
Development program for a liquid methane heat pipe	Refurbishment of solar simulation optical train
01 p0003 A/4-14046	mirror assemblies (NASA-CR-134123] 01 p0018 N74-12016
Natural qas as an automotive fuel, an experimental study	WITROGEN
[BM-RI-7806] 01 p0011 N74-10715	Physical behaviour of some biowaste gases in an
HICROWAVE TRANSMISSION	ion engine [ATAA PAPER 73-1113] 01 p0001 174-10691
Satellite nuclear power station: An engineering analysis Book	NTTROCEN OTTORS
01 p0002 A74-13234	Conversion of fuel nitrogen to NOx in a compact
Regional and global energy transfer via passive	Combustor [ASHE PAPER 73-WA/GT-2] 01 p0002 A74-13293
power relay satellites 01 p0005 A74-16116	The jet engine design that can drastically reduce
BILITARY TECHNOLOGY	oxides of mitrogen
Investigation of chemical APU application for	[AIAA PAPER 74-160] 01 p0006 A74-18797 MOISE REDUCTION
small ground power sources [AD-765724] 01 p0009 N74-10082	Refan program. Phase 1: Summary report
MINERAL DEPOSITS	[NASA-TM-X-71456] 01 p0009 N/4-10043
Bitumen-hearing rocks as potential energy	Section 4: Propulsion and energy 01 p0026 N74-14671
sources 01 p0028 N74-15226	NONEOUILIBRIUM PLASMAS
Coal	Optimization of the power of Faraday MHD qenerators operating on noneguilibrium plasma
01 p0028 N74-15230	01 p0003 A74-13943
Nuclear fuels: Uranium 01 p0028 x74-15257	Characteristics of a nonequilibrium MHD generator
Nuclear fuels: Thorium	01 p0005 a74-17439
01 p0029 N74-15258 Factors affecting the use of coal in present and	Self-contained low power atomic plants for
future energy makers background paper for	converting nuclear energy into electrical power [AD-766969] 01 p0014 N74-11519
Congressional investigation of earth resources	[AD-766969] 01 p0034 N/4-11519 Si-Au Schottky barrier nuclear battery for
and energy policies 01 p0031 N74-15684	medical applications
MINERAL EXPLORATION	[TID-26342] 01 p0017 N74-11851
BRTS-1 imagery use in reconnaissance prospecting: Evaluation of the commercial utility of BRTS-1	MUCLEAR EMBRGY The U.S. energy problem. Volume 2: Appendices,
imagery in structural reconnaissance for	part A to include alternate energy sources
minerals and petroleum interpretation of	for fossil fuels [PB-207518] 01 p0017 H74-11795
Colorado region [E74-10007] 01 p0013 N74-11148	Energy research and development: A selected
Investigations using data in Alabama from ERTS-A	reading list
land use, mineral exploration, qeology,	[ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 From scientific research to the atomic industry
hydrology, water resources, data processing, data management, marine environments	history of nuclear power industry
[E74-10124] 01 p0023 N74-13051	(JPRS-60584) 01 p0023 N74-13428 Legal considerations and constraints on US nuclear
WINE (RYCAVATIONS)	nolicy
Study of application of ERTS-A imagery to fracture-related mine safety hazards in the coal	[AD-754641] 01 p0024 N74-13697
mining industry Indiana	NUCLEAR FUEL ELEMENTS
[E74-10083] 01 p0014 N74-11195 Trends in the mechanization of the coal industry	Isotope kilowatt program [ORNL-TM-4243] 01 p0025 N74-14377
and quarantee of patent-ability of designs that	BUCLEAR POELS
are competitive on the world technological level	Nuclear fuels: Uranium 01 p0028 N74-15257
computerized data retrieval system for development of hydraulic equipment	Nuclear fuels: Thorium
01 p0016 N74-11759	01 p0029 n74-15258
The history of technology and engineering solutions	NUCLEAR FUSION Evolution of studies in the field of gas lasers
computerized data retrieval for coal mine planning	01 p0005 174-16909
01 p0016 N74-11760	HUCLBAR PHYSICS
<pre>Porecasting of technological progress for long-range planning of mining operations at coal</pre>	Prom scientific research to the atomic industry history of nuclear power industry
long-range planning of mining operations at coal mines prediction analysis technique for	[JPRS-60584] 01 p0023 N74-13428
operational development	

01 p0016 N74-11765

BUCLEAN POWER PLANTS SUBJECT INDEX

NUCLER PORES PLANTS PERFORMANCE PREDICTION Satellite nuclear power station; An engineering analysis --- Book Qualitative analysis of the efficiency of MHD energy conversion 01 p0002 A74-13234 01 00003 474-13944 Calculations on a solar energy system --- for electric power and heat generation in buildings first-17731 01 p0023 N74-13538 Self-contained low power atomic plants --- for converting nuclear energy into electrical power [AD-766969] 01 p0014 N74-11519 [LBL-1773]
PERFORMANCE TESTS NUCLEAR POWER REACTORS (FURMANCE TESTS) Development of design criteria, cost estimates, and schedules for an MHD high performance Assessment of lightweight mobile nuclear power systems 01 p0006 a74-17813 demonstration experiment BUCLEAR PROPELLED AIRCRAFT
Assessment of lightweight mobile nuclear power [AD-766232] 01 p0017 N74-11952 PHOSPHORIC ACID systems Matrices for H3PO4 fuel cells 01 p0006 A74-17813 CAD-7663121 01 p0010 N74-10086 NUCLEAR BRACTORS PHOTOGROLOGY Energy situation and nuclear power --- qlobal applications of nuclear reactors ERTS-1 imagery use in recommaissance prospecting: Prolight in reconnaissance prospecting Evaluation of the commercial utility of ERTS-1 imagery in structural reconnaissance for 01 p0029 N74-15391 pinerals and petroleum --- interpretation of Colorado region 0 [E74-10007] 01 p0013 N74-11148 Petroleum exploration subprogram: Geological Relevance of ERTS to the State of Ohio --interpretation of proportional imagery from ERTS-A satellite management and planning of state resources [E74-10024] 01 p0013 N74-11159 [E74-10213] 01 p0028 N74-15020 Applicability of Skylab remote sensing for Oil exploration subprogram geological detection and monitoring of surface mining interpretation of images provided by the ERTS-A satellite --- Bolivia (NASA-TT-F-15265) 01 p0028 N74-15 activities --- Ohio, West Virginia, and Pennsylvania 01 p0028 N74-15070 FE74-101607 01 p0024 N74-14028 PROTOINTERPRETATION OIL EXPLORATION Petroleum exploration subprogram: Geological ERTS-1 inaquery use in reconnaissance prospecting: Evaluation of the commercial utility of ERTS-1 imagery in structural reconnaissance for interpretation of proportional imagery from ERTS-A satellite FE74-10213] 01 p0028 N74-15020 Oil exploration subprogram geological interpretation of images provided by the ERTS-A satellite --- Bolivia (NASA-TT-P-15265) O1 p0028 074-15 minerals and petroleum --- interpretation of Colorado region f P74-100071 01 p0013 N74-11148 An evaluation of the suitability of ERTS data for the purposes of petroleum exploration ---qeological structures of Oklahoma 01 p0028 N74-15070 Quantification of the luminescence intensity of Petroleum exploration subprogram: Geological interpretation of management of the subprogram of the sub natural materials 01 p0005 A74-14892 interpretation of proportional imagery from PHOTOMETERS ERTS-A satellite Investigation of silicon photoelectric cells as precision photodetectors --- electro-optical properties of silicon solar cells ΓE74-102131 01 p0028 N74-15020 Oil exploration subprogram qeological interpretation of images provided by the ERTS-A satellite --- Bolivia [NRC-TT-1686] 01 p0010 N74-10199 PHOTOSENSITIVITY [NASA-TT-P-15265] 01 p0028 N74-15070 Photosensitive elements for solar sensors OKLAHONA 01 p0005 A74-17296 An evaluation of the suitability of ERTS data for the purposes of petroleum exploration ---Transmission and storage of hydrogen qeological structures of Oklahoma 01 p0015 N74-11732 FR74-100291 PLANTS (BOTANY) ORBITAL SPACE STATIONS Peat Ose of Shuttle in establishing large space 01 p0029 N74-15261 installations PLASMA HEATING 01 p0004 A74-14121 Heating of a substance by an arc plasma 01 p0001 174-10463 PLASMA PHYSICS Significant research results for 1971, High PADDLES Temperature Institute, USSR Academy of Sciences --- plasma physics and gas dynamics Current European developments in solar paddle drives 01 p0014 N74-11672 FAD-7657531 01 p0012 N74-10898 PARABOLIC REFLECTORS PLASSA TEMPERATURE Theoretical performance of cylindrical parabolic Characteristics of a nonequilibrium MRD generator solar concentrators 01 p0005 174-17439 01 p0001 A74-10026 PATRET POLICY Optimization of the power of Paraday MHD Trends in the mechanization of the coal industry qenerators operating on nonequilibrium plasma and quarantee of patent-ability of designs that are competitive on the world technological level 01 p0003 A74-13943 --- computerized data retrieval system for development of hydraulic equipment Substitute catalysts for platinum in automobile emission control devices and petroleum refining [PB-222167/9] 01 p0018 N74-11941 01 p0016 N74-11759 PENNSYLVANIA POLICIES Interdisciplinary applications and interpretations Compendium of university forums of the National of ERTS data within the Susquebanna River Basin (resource inventory, land use, and pollution) [E74-10061] 01 p0013 N74-11182 Commission on Materials Policy, May - June 1972-à background document. NCMP forum on Technological Innovation in the Production and Utilization of Materials at Pennsylvania State University, on 19-21 June 1972 [PB-223679/2GA] 01 p0025 874-142 Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- Ohio, West Virginia, and 01 p0025 N74-14251 Pennsylvania [E74-10160] POLLUTION 01 p0024 N74-14028 Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061] 01 p0013 N74-11182

SHELDER TERRY REMOTE SERSORS

POLYMERIC FILMS

Properties of solid polymer electrolyte fluorocarbon film --- used in hydrogen/oxygen OBALITATIVE ANALYSIS fuel cells Qualitative analysis of the efficiency of MHD [NASA-TN-D-7492] 01 p0011 N74-10547 PORES ADALGE CONVALSION 01 50003 378-13988 Solar ponds extended [UCID-16317] 01 p0023 N74-13537 POTASSIDA R Characteristics of a nonequilibrium SHD generator 01 p0005 A74-17439 RADIANT PLUX DENSITY Theoretical performance of cylindrical parabolic PORER CORRESTORING solar concentrators Power conditioning system for FAA Air Route 01 20001 274-10026 Traffic Control Centers 01 p0004 A74-14133 Solar heat utilization in residential heating Power conditioning system for FAA air route custems traffic control centers 01 00019 874-12664 01 n0019 N74-12636 RADIATION PRESSURE POWER EFFICIENCY Effect of the sun, the moon and solar radiation pressure on a near-equatorial synchronous Optimization of the power of Faraday MHD generators operating on moneguilibrium plasma 01 p0003 A74-13943 satellite 01 00003 174-13559 POWER PLANTS RADIO RELAY SYSTEMS The 1.5-kW fuel cell powerplant Regional and global energy transfer via passive [AD-767302] 01 00022 174-12744 power relay satellites POWER SUPPLIES 01 n0005 A74-16116 Recent developments in the field of thermionic power conversion and its possible effects on PARTOACTIVE ISOTOPES Isotope kilowatt program power supply systems in space and on earth 01 B0025 874-14377 01 p0005 A74-17195 FORNL-TM-42431 fDGLR PAPER 73-092] 01 p0005 A74-Study of fuel cell system for powered balloom -RADIOACTIVE WASTES Summary of the study of disposal of nuclear waste reusable powerplants [AD-766253] into space 01 p0009 N74-100B3 01 p0005 A74-16123 The NASA-Lewis terrestrial photovoltaics program Feasibility of space disposal of radioactive nuclear waste. 1: Executive summary [NASA-TM-X-2911] 01 p0025 M --- solar cell power system for weather station
[NASA-TM-X-71491] 01 p0028 N74-14788 01 p0025 N74-14533 POWER TRANSMISSION RAIL TRANSPORTATION Satellite nuclear power station: An engineering Energy trends and their future effects upon transportation --- applied to rail, truck, and analysis --- Book 01 p0002 A74-13234 air cargo operations and private energy uses PREDICTION ANALYSIS TECHNIQUES Manergy: An energy management model of the United States for the prediction of energy demand, [P-5046] RANKTHE CYCLE Vapor generator feed pump for Rankine cycle resource consumption, environmental effects, the autonotive propulsion system (Chandler Evans)
[PB-22849/2]
01 p0011 N74-10747 assessment of new technology, and energy resource alternatives RAPID TRANSIT SYSTEMS 01 p0026 N74-14665 EPA pollution regulations and fuel shortage: The PRESSURE REDUCTION Chemical storage of hydrogen in Ni/H2 cells impact on mass transit 01 p0004 A74-14248 REACTOR TECHNOLOGY PRODUCTION ENGINEERING Fabrication and testing of negative-limited sealed Assessment of lightweight mobile nuclear power nickel-cadmium cells systems 01 p0009 N74-10078 [NASA-CR-135981] The history of technology and engineering solutions --- computerized data retrieval for coal mine RECLAMATION Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- Ohio, West Virginia, and planning 01 b0016 N74-11760 Pennsylvania The 1.5-kW fuel cell powerplant [E74-10160] 01 p0024 N74-14028 01 p0022 N74-12744 FAD-7673021 REPTATAG PRODUCTION PLANNING The history of technology and engineering solutions The refining of turbine fuels by modern hydrotreating --- computerized data retrieval for coal mine [AIAA PAPER 74-162] 01 p0006 A74-18798 planning Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues 01 p0016 N74-11760 Forecasting of technological progress for long-range planning of mining operations at coal mines --- prediction analysis technique for operational development 01 p0006 A74-18925 [DFVLR-SONDDR-301] REGULATIONS National energy policy 01 D0021 N74-12681 01 p0016 N74-11765 RELIABILITY ENGINEERING PROMETHIUM ISOTOPES Power conditioning system for PAA Air Route Traffic Control Centers Si-Au Schottky barrier nuclear battery --- for medical applications 01 p0017 N74-11851 01 p0004 A74-14133 FTID-263421 PROPULSION SYSTEM COMPIGURATIONS Power source quality --- consequence and cures of Section 4: Propulsion and energy source deficiencies in quality of ac electric 01 p0026 N74-14671 nower service 01 p0019 N74-12635 PROPOLSIVE RPPICIBNCY Performance and noise aspects of supersonic BRHOTE SENSORS Quantification of the luminescence intensity of natural materials transport 01 p0003 A74-13798 PROTECTIVE COATINGS Present state of the art in conductive coating Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- Ohio, West Virginia, and technology. 01 b0006 \$74-1765# Pennsylvania 01 p0024 N74-14028 [E74-10160]

RESEARCH AND DEVELOPMENT SUBJECT INDEX

```
Research on the application of satellite remote
                                                                          DEPEND SOLDERED
      sensing to local, state, regional, and national programs involved with resource management and
                                                                             Quarterly bulletin of the Division of Mechanical
Engineering and the National Aeronautical
      environmental quality [NASA-CR-136472]
                                                                                Establishment, 1 July - 30 September 1973 -
                                            01 n0024 N74-14092
                                                                                reports on reynolds number effects, energy in transportation, and wave buoy accelerometer [DME/WAE-1973(3)] 01 p0023 N74-
RESEARCH AND DEVELOPMENT
   Evolution of studies in the field of gas lasers
01 p0005 A74-16909
                                                                                                                      01 p0023 N74-13673
                                                                          ROTOR SPEED
    Energy R and D inventory data base. Bibliography.
                                                                             Influence of wind frequency on rotational speed
                                                                                adjustments of windmill generators
[NASA-TT-P-15184] 01 p0012 N74-10948
                                            01 p0017 N74-11849
   The Federal Government and energy: R and D
      historical background
                                            01 p0021 N74-12687
   Energy research and development, 2
                                                                          SATELLITE ATTITUDE CONTROL
                                            01 D0027 N74-14692
                                                                             Technological problems with large-area solar cell
RESEARCH PACILITIES
                                                                                AFFAYS.
   University energy research centers
                                                                                [DGLE PAPER 73-107]
                                                                                                                      01 p0005 A74-17204
                                            01 p0019 N74-12668
                                                                          SATELLITE DESIGN
   An inventory of energy research, volume 2
                                                                              Satellite solar power stations to meet future
                                            01 p0021 N74-12689
                                                                                energy demands
RESEARCH PROJECTS
                                                                                                                      01 p0001 a74-11020
   Actual state of French technical developments
concerning sources of space power
                                                                             Technological problems with large-area solar cell
                                                                                arrays
                                            01 p0002 A74-12794
                                                                                                                      01 p0005 A74-17204
   Energy research and development: An overview of our national effort
                                                                          SATELLITE PERTURBATION
                                                                             Effect of the sun, the moon and solar radiation
pressure on a near-equatorial synchronous
                                            01 n0016 N74-11788
   An inventory of energy research, volume 1
                                                                                satellite
                                            01 p0021 N74-12688
                                                                                                                      01 p0003 A74-13559
   an inventory of energy research, volume 2
                                                                          SATELLITE POWER TRANSMISSION (TO BARTH)
                                            01 p0021 N74-12689
                                                                             Use of Shuttle in establishing large space
   Buergy policy research and the State of Florida
                                                                                installations
     f P-50781
                                            01 p0026 N74-14684
                                                                                                                      01 p0004 A74-14121
   Conservation and efficient use of energy, part 1
01 p0030 N74-15682
                                                                             Regional and global energy transfer via passive
                                                                                power relay satellites
PRCPOURC
                                                                                                                      01 p0005 A74-16116
   Review of world energy supplies --- reserves and resources of fossil and fissile fuels
                                                                          SATELLITE SOLAR POWER STATIONS
                                                                             Satellite solar power stations to meet future
     [ IGU/A-1-73 ]
                                            01 p0026 N74-14666
                                                                                energy demands
RESOURCES MANAGEMENT
                                                                                                                      01 p0001 A74-11020
   Relevance of BRTS to the State of Chic ---
management and planning of state resources
                                                                             The use of the Space Shuttle to support large
                                                                               space power generation systems
     [ E74-10024 ]
                                            01 p0013 N74-11159
                                                                                                                      01 00003 374-19112
   Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution)
[E74-10061] 01 p0013 N74-11182
Satellite qeological and qeophysical remote sensing of Iceland
                                                                             Solar power for our nation
                                                                                                                      01 00004 174-14465
                                                                          SATELLITE-BORNE INSTRUMENTS
                                                                             Current European developments in solar paddle drives
                                                                                                                      01 p0014 R74-11672
                                                                          SEDIMENTARY ROCKS
     [ E74-10073]
                                            01 p0014 N74-11188
                                                                             Oil shale
   Applications of meteorology to natural resource planning --- agriculture, forestry, energy, and
                                                                                                                      01 p0029 N74-15260
                                                                          SEMICONDUCTING FILES
     recreation
                                                                             Present state of the art in conductive coating
                                            01 p0014 N74-11395
                                                                               technology
   The Pederal Government and energy: R and D historical background
                                                                                                                      01 n0006 174-17654
                                                                          SENICORDUCTOR JUNCTIONS
                                           01 p0021 N74-12687
                                                                             A novel method of cooling semiconductor devices
   Energy research and development: A selected
                                                                               for power electronics
     reading list
                                                                               [ BMFT-FB-T-73-021
                                                                                                                      01 p0015 N74-11739
     [ORNL-BIS-73-65-REV-1]
                                           01 p0022 N74-12695
                                                                          SEPARATORS
   Research on the application of satellite remote
                                                                             Impinging jet separators for liquid metal
     sensing to local, state, regional, and national programs involved with resource management and environmental quality
                                                                               magnetohydrodynamic power cycles
                                                                               FNASA-CR-1365521
                                                                                                                     01 p0027 H74-14785
                                                                          SHALES
     [ NASA-CR-136472]
                                           01 p0024 N74-14093
                                                                             Oil shale
   Bitumen-bearing rocks --- as potential energy
                                                                                                                      01 p0029 n74-15260
     Sources
                                                                          SHOCK WAVES
                                           01 p0028 N74-15226
                                                                             Investigation of a non-equilibrium MHD generator
   Coal
                                                                               [AD-766493]
                                                                                                                      01 p0013 N74-10950
                                           01 p0028 N74-15230
                                                                         SILTCOR
   Geothermal resources --- exploitation for energy
                                                                             Si-Au Schottky barrier nuclear battery --- for
     applications
                                                                               medical applications
                                           01 p0028 N74-15240
                                                                               [TID-26342]
                                                                                                                     01 p0017 N74-11851
   Nuclear fuels: Uranium
                                                                         SILICON ALLOYS
                                           01 p0028 N74-15257
                                                                             State of developments and research problem on the
   Nuclear fuels: Thorium
                                                                               switching of silicon germanium alloy
                                           01 p0029 N74-15258
                                                                               thermoelectric elements
   Oil and das
                                                                               FAD-765845]
                                                                                                                     01 p0009 N74-10080
                                           01 p0029 N74-15259
                                                                         SILICON JUNCTIONS
                                                                             Investigation of silicon photoelectric cells as
                                           01 p0029 N74-15261
                                                                               precision photodetectors --- electro-optical
   Assessment of geothermal energy resources
                                                                               properties of silicon solar cells
                                           01 p0030 N74-15661
                                                                               INRC-TT-16861
                                                                                                                     01 p0010 N74-10199
   Factors affecting the use of coal in present and
                                                                         SILICON TRANSISTORS
     future energy makers --- background paper for
Congressional investigation of earth resources
                                                                             Photosensitive elements for solar sensors
                                                                                                                     01 p0005 a74-17296
     and energy policies
                                           01 p0031 N74-15684
```

SOLAR RADIATION SUBJECT INDEX

An assessment of solar energy as a national energy SOCIAL FACTORS resource Aviation needs and public concerns --- civil aviation growth in Europe and environmental 01 p0019 974-12462 [MASA-CR-136191] TERRASTAR: Terrestrial application of solar technology and research [NASA-CR-129012] 01 p0027 R74-14749 01 p0020 N74-12674 SOLAR ARRAYS Energy consumption: Past, present, future 01 p0020 F74-12675 High voltage solar cell power generating system for requiated solar array development [AIAA PAPER 73-1105] 01 p0 Components for solar energy 01 n0002 A74-12242 01 p0020 N74-12678 The use of the Space Shuttle to support large Solar power generation and distribution space power generation systems 01 p0021 N74-12680 01 20003 474-16112 Solar energy potential Technological problems with large-area solar cell 01 D0021 N74-12682 arranc Impacts of solar energy utilization 01 p0005 A74-17204 [DGLR PAPER 73-107] 01 p0021 N74-12683 Present state of the art in conductive coating Barket potential for solar heating and cooling in technology hnildings 01 p0006 174-17654 01 p0021 N74-Testing for thermal fatigue failures in solar arrays Strategy for solar heating and cooling in buildings --- space environment simulation in temperature 01 p0021 N74-12685 cycling vacuum chamber Solar ponds extended 01 p0010 N74-10240 01 p0023 N74-13537 [DCID-16317] method of making silicon solar cell array --- and [OCID-16317] Of pub23 874-13337
Solar energy power system --- using freen
[NASA-CASE-MFS-21628-1] Of p0025 874-14496
Proceedings of the Solar Heating and Cooling for
Buildings Workshop, Part 1: Technical mounting on flexible substrate
[NASA-CASE-LEW-11069-1] 01 p0027 N74-14
The NASA-Lewis terrestrial photovoltaics program 01 p0027 N74-14784 Buildings Workshop. Part 1: sessions, March 21 and 22 [PB-223536/4GA] --- solar cell power system for weather station fNASA-TG-I-714911 01 p0028 N74-14788 01 00025 874-14499 SOLAR CRLLS SOLAR ENERGY ABSORBERS Spacecraft electrical power --- solar cells and TERRASTAR: Terrestrial application of solar technology and research [NASA-CE-129012] 01 p0020 N storage batteries 01 p0002 A74-12201 01 p0020 N74-12674 Vitreous oride antireflection films in SOLAR FURNACES high-efficiency solar cells Solar-energy for heating and cooling 01 p0004 A74-14250 01 p0016 N74-11787 Photosensitive elements for solar sensors 01 p0005 A74-17296 SOLAR GENERATORS Satellite solar power stations to meet future Investigation of silicon photoelectric cells as energy demands precision photodetectors --- electro-optical 01 p0001 A74-11020 properties of silicon solar cells Actual state of French technical developments concerning sources of space power 01 p0010 N74-10199 [NRC-TT-1686] INNC-TT-1886 | 01 pU070 N/4-10199
The use of FEP Teflon in solar cell cover technology
[NASA-TH-X-71485] 01 p0012 N74-10944
The multiple function edge illuminated solar cell
[NASA-TH-I-71476] 01 p0012 N74-10947 01 p0002 A74-12794 Technological problems with large-area solar cell 01 p0005 174-17204 [DGLR PAPER 73-107] Method of making silicon solar cell array --- and Current European developments in solar paddle drives 01 p0014 N74-11672 mounting on flexible substrate [NASA-CASE-LEW-11069-1] 01 p0027 N74-14784 Components for solar energy The NASA-Lewis terrestrial photovoltaics program --- solar cell power system for weather station
[NASA-TH-X-71491] 01 p0028 K74-14788 01 p0020 N74-12678 Solar heating and cooling buildings 01 p0020 N74-12679 SOLAR COLLECTORS Solar power generation and distribution Theoretical performance of cylindrical parabolic 01 p0021 N74-12680 solar concentrators SOLAR HEATING 01 p0001 A74-10026 Solar energy to meet the nation's energy needs { NASA-TH-X-68290 } 01 p0011 N74 Refurbishment of solar simulation optical train 01 p0011 N74-10754 mirror assemblies Solar-energy for heating and cooling 01 p0018 N74-12016 01 p0016 N74-11787 Components for solar energy An assessment of solar energy as a national energy 01 p0020 N74-12678 resource Solar heating and cooling buildings 01 p0019 N74-12462 [NASA-CR-1361911 01 p0020 N74-12679 Solar heat utilization in residential heating Calculations on a solar energy system --- for electric power and heat generation in buildings systems 01 p0019 N74-12664 01 p0023 N74-13538 [LBL-1773] Proceedings of the Solar Heating and Cooling for Buildings Workshop. Part 1: Technical TERRASTAR: Terrestrial application of solar technology and research 01 p0020 N74-12674 sessions, March 21 and 22 [PB-223536/4GA] 01 p0025 N74-14499 Solar heating and cooling buildings 01 p0020 N74-12679 SOLAR BNERGY Solar power generation and distribution Solar power for our mation 01 p0021 n74-12680 01 p0004 A74-14465 Solar energy potential Solar energy to meet the nation's energy needs 01 p0021 N74-12682 01 p0011 N74-10754 [NASA-TM-1-68290] Market potential for solar heating and cooling in Solar energy for the terrestrial generation of huildings. electricity 01 p0021 N74-12684 01 p0012 N74-10896 Strategy for solar heating and cooling in huildings Solar-energy for heating and cooling 01 p0016 N74-11787 01 p0021 N74-12685 The U.S. energy problem. Volume 2: Appendices, part A --- to include alternate energy sources SOLAR RADIATION Effect of the san, the moon and solar radiation pressure on a near-equatorial synchronous for fossil fuels
[PB-207518] satellite 01 p0017 N74-11795 The U.S. energy problem. Volume 2: Appendices, part B --- to include development of alternate 01 p0003 A74-13559 Solar energy to meet the nation's energy needs [NRSA-TH-X-68290] 01 p0011 N74-10754

power sources to reduce fossil fuel consumption

[PB-207519]

01 p0017 N74-11796

SOLAR REFLECTORS SUBJECT INDEX

SOLAR REPLECTORS Use of Shuttle in establishing large space installations	STRUCTURAL PROFERTIES (GEOLOGY) ERTS-1 imagery use in reconnaissance prospecting: Byaluation of the commercial utility of ERTS-1
SOLAR SBUSORS	<pre>imagery in structural reconnaissance for minerals and petroleum interpretation of</pre>
Photosensitive elements for solar sensors 01 p0005 A74-17296 SOLAR SIMULATORS Befurbishment of solar simulation optical train mirror assemblies	Colorado region [E74-10607] An evaluation of the suitability of ERTS data for the purposes of petroleum exploration
[NASA-CR-134123] 01 p0018 N74-12016 SOLID STATE DEVICES	qeological structures of Oklahoma [E74-10029] 01 p0018 %74-12119 SUBSOBIC AIBCRAPT
Solid state hydrogen gas generator rocket deployed balloons inflation [Alaa PAPER 73-1232] 01 p0001 A74-11257 Power conditioning system for FAA Air Route	An initial step: A demonstration project promoting subsonic, hydrogen-fueled aircraft 01 p0016 N74-11747
Traffic Control Centers 01 p0004 A74-14133	SULFUR COMPOUNDS Combustion of the gases methane, LP gas and ammonia in a mixing reactor air pollution
SPACE PROGRAMS The second fifteen years in space; Proceedings of the Eleventh Goddard Memorial Symposium,	CONTROL device (FOA-1-C-1442-B3) 01 p0022 N74-12824 SULFURIC ACID
Washington, D.C., March 8, 9, 1973 01 p0004 A74-14463	Present air pollution situation in Kawasaki city and future countermeasures
SPACE SHUTTLES The use of the Space Shuttle to support large space power generation systems	[KS-27] 01 p0018 N74-12321 SUPERSONIC COMBUSTION RAMJET ENGINES
01 p0003 A74-14112 Use of Shuttle in establishing large space	The jet engine design that can drastically reduce oxides of mitrogen [AIAA PAPER 74-160] 01 p0006 A74-18797
installations 01 p0004 A74-14121 Summary of the study of disposal of nuclear waste	Emission calculations for a scramfet powered hypersonic transport [NASA-TH-X-71464] 01 p0018 N74-12445
into space 01 p0005 A74-16123 Peasibility of space disposal of radioactive	Design considerations for the airframe-integrated scramjet
nuclear waste. 1: Executive summary [NASA-TH-X-2911] 01 p0025 N74-14533	[NASA-TH-1-2895] 01 p0019 N74-12448 SUPERSONIC TRANSPORTS Performance and noise aspects of supersonic
SPACECRAPT MODULES Use of Shuttle in establishing large space installations	transport 01 p0003 174-13798
SPACECRAFT POWER SUPPLIES 01 p0004 A74-14121	Aviation fuels and lubricants 01 p0006 A74-18780 SUSQUEHARRA RIVER BASIN (HD-NY-PA)
Spacecraft electrical power solar cells and storage batteries	Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin
01 p0002 174-12201 Righ voltage solar cell power generating system for regulated solar array development [AIAA PAPER 73-1105] 01 p0002 174-12242	(resource inventory, land use, and pollution) [E74-10061] SINCHRONOUS MOTORS The synchronous EFD device
Actual state of French technical developments concerning sources of space power	O1 p0024 N74-13759 STHCHRONOUS SATELLITES
01 p0002 A74-12794 Energy supply and energy transformers in satellites and spacecraft	Satellite nuclear power station: An engineering analysis Book 01 p0002 A74-13234
01 p0006 k74-18189 SPACECRAFT RADIATORS Development program for a liquid methane heat pipe	Effect of the sun, the moon and solar radiation pressure on a near-equatorial synchronous satellite
91 p0003 A74-14046 SPACECRAPT SHIELDING Present state of the art in conductive coating	01 p0003 A74-13559 Use of Shuttle in establishing large space installations
technology 01 p0006 k74-17654	SYSTEM PAILURES 01 p0004 A74-14121
SPACECRAFT STABILITY Photosensitive elements for solar sensors 01 p0005 174-17296	Power source quality consequence and cures of source deficiencies in quality of ac electric power service
STANDARDS Trends in the mechanization of the coal industry	O1 p0019 N74-12635
and quarantee of patent-ability of designs that are competitive on the world technological level computerized data retrieval system for development of hydraulic equipment	HHD for power generation: The view of a chosen few [AD-760342] 01 p0025 %74-14408
STORAGE BATTERIES 01 p0016 N74-11759	Ţ
Spacecraft electrical power solar cells and storage batteries	TABLES (DATA) Energy: Compiled bibliography and tables of world resources, consumption, and wastes
STRIP HINING 01 p0002 A74-12201	(LRP-63/73) 01 p0010 N74-10391 TECHNOLOGICAL FORECASTING
Applicability of Skylab remote sensing for detection and monitoring of surface mining activities Ohio, West Virginia, and	Evolution of studies in the field of qas lasers 01 p0005 A74-16909 Forecasting of technological progress for
Pennsylvania [E74-10160] Strip-mined watershed hydrologic data acquisition	<pre>long-range planning of mining operations at coal mines prediction analysis technique for operational development</pre>
PB-223558/8GA] Of nOO25 N74-14105	O1 p0016 N74-11765
STRUCTURAL DESIGN Fabrication and testing of negative-limited sealed nickel-cadmium cells	The technology and economics of commercial airplane design. I
[NASA-CR-135981] 01 p0009 N74-10078	Gas generators - A perspective alternative
	energy sources comparison [AILA PAPER 73-1168] 01 p0001 A74-11219

VACUUM APPARATUS CHRIPCO THORY

Possibility of commutating thermoelectric

Thermoelectric generators --- radio relay station power supply application batteries with the aid of mercury amalgam FAD-7560681 01 00002 274-13448 THERMOELECTRIC MATERIALS Thermoelectric generators --- radio relay station power supply application Assessment of lightweight mobile nuclear power systems 01 p0006 174-17813 01 D0002 A74-13448 The refining of turbine fuels by modern THERMOELECTRIC POWER GENERATION hydrotreating
[AIAA PAPER 74-162]
TBCHNOLOGY TRANSFER Thermoelectric generators --- radio relay station power supply application 01 p0006 A74-18798 01 p0002 A74-13448 Industrial use of aerospace technology THERMONUCLEAR POWER GENERATION 01 p0002 A74-12905 Energy consumption: Past, present, future 01 p0020 k74-12675 Liquid metal magnetohydrodynamics (LMMHD) technology transfer feasibility study. 1: Summary Nuclear fuels: Thorium FNASA-CR-1361971 01 p0023 N74-13466 04 20020 874-15258 Liquid metal magnetohydrodynamics (LHMHD) technology transfer feasibility study. TRYRISTORS Volume A novel method of cooling semiconductor devices 2: Appendixes for power electronics
[BMFT-FB-T-73-02] [NASA-CH-136198]
TECHNOLOGY UTILIZATION 01 p0023 N74-13467 A1 DOD15 N74-11739 TRANSPORT AIRCHAPT Industrial use of aerospace technology
01 p0002 A74-12905 Emission calculations for a scramjet powered hypersonic transport [NASA-TH-X-71464] The use of the Space Shuttle to support large 01 p0018 N74-12445 space power generation systems Economics of air transport --- direct and indirect 01 50003 174-14112 Technological problems with large-area solar cell costs 01 p0026 N74-14682 INASA-TT-F-152491 arravs TRANSPORTATION 01 p0005 A74-17204 [DGLE PAPER 73-107] 01 p0005 A74-17 Geothernal resources --- exploitation for energy Quarterly bulletin of the Division of Mechanical Engineering and the National Aeronautical applications Engineering and the Mational Replaced Fatablishment, 1 July - 30 September 1973 --reports on reynolds number effects, energy in
transportation, and wave huoy accelerometer
[DME/NAE-1973(3)] 01 p0023 N74-01 p0028 N74-15240 TEFLON (TRADEBARK) The use of FBP Teflon in solar cell cover technology
[NASA-TM-X-71485] 01 p0012 N74-10944 01 p0023 N74-13673 01 p0012 N74-10944 Energy in transportation --- energy costs of TRIBS passenger and cargo transportation Development of qeothermal reservoirs from over-pressured areas beneath the Gulf coastal plain of Texas. A feasibility study of power Where are we headed in air transport? --- trends production from overpressured reservoirs 01 p0018 N74-12183 for future aircraft design [AD-766855]
THREMAL CYCLING TESTS Testing for thermal fatique failures in solar arrays TRUCKS Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses [P-5046] 01 p0017 874-11791 --- space environment simulation in temperature cycling vacuum chamber 01 p0010 N74-10240 rp-5046] THERMAL ENERGY TURBOGENERATORS Heating of a substance by an arc plasma Investigation of chemical APU application for small ground power sources
[AD-765724] 01 p0001 A74-10463 THERBAL PRACTORS 01 p0009 N74-10082 Exploratory development of a glass ceramic automobile thermal reactor --- anti-pollution TORBOJET ENGINES Effect of water injection on nitric oxide emissions of a gas turbine combustor burning devices 01 m0019 N74-12447 [NASA-CR-134531] natural das fuel [NASA-TH-X-2959] THERMIONIC CONVERTERS Thermionic energy conversion. Volume I - Processes and devices --- Book 01 p0025 N74-14651 Section 4: Propulsion and energy 01 p0026 N74-14671 01 n0004 374-14327 Recent developments in the field of thermionic power conversion and its possible effects on u power supply systems in space and on earth 01 p0005 A74-17195 fDGLE PAPER 73-092] 01 p0005 A74-Gas-heated 'heat pipe' vacuum furnace --- using # S S R R Commerical petroleum products, properties and applications --- USSR petroleum industry bandbook [AD-754703] 01 p0010 N74-10128 thermionic energy conversion [AD-754703] 01 p0007 A74-19724 UNITED STATES OF AMERICA Self-contained low power atomic plants --- for converting nuclear energy into electrical power Legal considerations and constraints on US nuclear 01 p0014 N74-11519 policy
[AD-754641] [AD-7669691 01 p0024 N74-13697 THERMIONIC POWER GENERATION Recent developments in the field of thermionic power conversion and its possible effects on DELVERSITY PROGRAM University energy research centers power supply systems in space and on earth [DGLE PAPER 73-092] 01 p0005 x 01 p0019 N74-12668 01 p0005 A74-17195 URANIUM ISOTOPES Nuclear fuels: Oranium THERMOCOUPLES 01 p0028 N74-15257 Possibility of commutating thermoelectric pssibility of commutating introduction batteries with the aid of mercury analgam of pco10 N74-10084 URBAN TRANSPORTATION EPA pollution regulations and fuel shortage: The [AD-756068] THER HODYNAMIC PROPERTIES impact on mass transit Aviation turbine fuels, 1972 01 p0027 N74-14690 01 p0014 N74-11592 THERMOBLECTRIC GENERATORS Thermoelectric generators --- radio relay station power supply application VACUUM APPARATUS Thermionic energy conversion. Volume I - Processes and devices --- Book 01 p0002 A74-13448 State of developments and research problem on the switching of silicon germanium alloy thermoelectric elements 01 p0004 A74-14327

01 p0009 N74-10080

IAD-7658451

VACUUM CHAMBERS SUBJECT INDEX

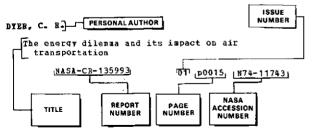
VACUUM CHAMPERS Testing for thermal fatigue failures in solar arrays cycling vacuum chamber 01 p0010 N74-10240 Gas-heated 'heat Dipe' vacuum furnace --- using thermionic energy conversion 01 p0007 A74-1972# Beating of a substance by an arc plasma 01 p0001 A74-10063 VAPORTZERS Vapor generator feed pump for Rankine cycle automotive propulsion system (Chandler Evans)
[PB-222849/2]
01 p0011 N74-10747 VAPORIZING Directional properties of coal and their utilization in underground gasification experiments f 88-TDR-733 01 p0018 N74-12159 VEGETATION Peat 01 p0029 N74-15261 VISCOUS PLUIDS fuctor factors and full factors with gelled fuel-flowmeter calibration, fuel boost pump and dettison tosts FAA-NA-73-431 01 p0017 N74-11828 VITREOUS MATERIALS Vitreous oxide antireflection films in high-efficiency solar cells 01 00000 \$74-14250 VOLTAGE CONVERTERS (AC TO AC)
On the theory of alternating-current electrofluiddynamic converters 01 p0007 A74-18988 WASTE DISPOSAL Summary of the study of disposal of nuclear waste into space 01 p0005 A74-16123 Feasibility of space disposal of radioactive nuclear waste. 1: Executive sunmary
[NASA-TH-X-2911] 01 p0 01 p0025 N74-16533 WASTE UTILIZATION Physical behaviour of some biowaste gases in an ion engine TAIAA PAPER 73-11131 01 p0001 A74-10691 WATER INJECTION Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] 01 p0025 N74-14651 WATER BESOURCES Investigations using data in Alabama from ERTS-A
--- land use, mineral exploration, geology,
hydrology, water resources, data processing, data management, marine environments [874-10124] 01 p0023 N74-13051 WATERSHEDS Strip-mined watershed hydrologic data acquisition study --- remote infrared aerial photography
[PB-223558/8GA] 01 p0025 N74-01 p0025 N74-14105 WEATHER STATIONS The NASA-Lewis terrestrial photovoltaics program --- solar cell power system for weather station [NASA-TM-X-71491] 01 p0028 N74-14788 WEST VIEGINIA Applicability of Skylab remote sensing for detection and monitoring of surface mining activities --- Chio, West Virginia, and Pennsylvania [274-10160] 01 p0024 N74-14028 WIND VARIATIONS Influence of wind frequency on rotational speed adjustments of windmill generators [NASA-TT-F-15184] WINDHILLS (WINDPOWERED MACHINES) 01 p0012 N74-10948 Influence of wind frequency on rotational speed adjustments of windmill generators
[NASA-TT-F-15184] 01 p0012 N74-10948

PERSONAL AUTHOR INDEX

ENERGY / A Continuing Bibliography (Suppl. 01)

MAY 1974

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal lauthor. The title or the document provides the user with a brief description of the subject matter The report number helps to indicate the type of document listed (e.g., NASA report, translation, NASA contractor report). The issue, page and accession numbers are located beneath and to the right of the title, e.g., p0015 N74-11743. Under any one author's name the accession numbers are arranged in sequence with the IAA accession numbers appearing first.

ADARS, A. A. Research on electrochemical energy conversion systems 01 p0013 N74-10951 [AD-7663291 HER, A. F.

Compendium of university forums of the National
Commission on Materials Policy, May - June 1972.

A background document. NCMP forum on
Technological Innovation in the Production and
Utilization of Materials at Pennsylvania State
University, on 19-21 June 1972
[PB-223679/2GA]

On p0025 N74-142 AGNER. A. P. 01 p0025 N74-14251 [PB-223679/2GA] 01 p0025 N74-14251
Compendium of University forums of the National
Commission on Materials Policy, May - June 1972.
A background document: University Forum on
National Materials Policy, Massachusetts
Institute of Technology on 30 May - 2 June 1972
[PB-223678/4GA] 01 p0029 N74-15290 AGNOWE, A.
The jet engine design that can drastically reduce oxides of nitrogen [AIAA PAPER 74-160] 01 p0006 A74-18 01 p0006 A74-18797 ALLEE, H. Proceedings of the Solar Heating and Cooling for Buildings Workshop. Part 1: sessions, March 21 and 22 [PB-223536/4GA] Technical 01 p0025 #74-14499 ALLSUF. J. B. Matural gas as an automotive fuel, an experimental study 01 p0011 #74-10715 [BH-RI-7806] ALPER, M. E. Liquid metal magnetohydrodynamics (LENED) technology transfer feasibility study. Volume 1: Summary [NASA-CE-1361971 Liquid metal magnetohydrodynamics (LMMHD) technology transfer feasibility study. 2: Appendixes 01 p0023 N74-13467 [NASA-CB-1361981 ALSTOB, W. B. Properties of solid polymer electrolyte fluorocarbon film [NASA-TN-D-7482] 01 p0011 N74-10547 ALVAREZ, H. C. Economics of air transport 01 p0026 N74-14682 [NASA-TT-P- 15249]

Study of application of ERTS-A imagery to fracture-related mine safety hazards in the coal ANATO R. V. mining industry 01 p0014 N74-11195 [B74-100837 AMBUD, W. B. Experimental two-phase liquid-metal magnetohydrodynamic generator program 01 p0013 N74-10952 [AD-766588] ANDERSON, G. Y.
Design considerations for the airfrage-integrated scraniet 01 p0019 N74-12448 [WASA-TM-X-2895] AMDERSON, J. L. Assessment of lightweight mobile nuclear power 01 p0006 A74-17813 ANDERSON, K. P.
Residential energy use: An econometric analysis
[R-1297-MSF] 01 p0032 B74-1 01 p0032 874-15698 AMTOMIDES, G. J.
Testing for thermal fatigue failures in solar arrays
01 p0010 N74-10240 ARABADZHEV, A. H.
Forecasting of technological progress for long-range planning of mining operations at coal 01 n0016 N74-11765 ARMSTONG, P. C. Nuclear fuels: Oranium 01 p0028 N74-15257 ARMOLD, J. H. Air mobility fuel cell study 01 p0022 N74-12742 [AD-766757] ATZEL, A-Present state of the art in conductive coating technology 01 p0006 A74-17654 AUSTIN, A. L. The hydrogen fuel economy and aircraft propulsion (AIAA PAPER 73-1319) 01 p0006 A74-17 01 p0006 A74-17905 AVBEL, J. A.
Aircraft fuel system tests with gelled fuel-flowmeter calibration, fuel boost pump and jettison tests [PAA-NA-73-43] 01 p0017 N74-11828 AVERITT. P. Coal 01 p0028 N74-15230 B BAKER, B. S.
Electrolyte for hydrocarbon air fuel cells
[AD-766313] 01 p0010

01 p0010 N74-10085 Matrices for H3PO4 fuel cells 01 p0010 N74-10086 [AD-766312] BARANOV, V. IU.
Oualitative analysis of the efficiency of MHD energy conversion 01 p0003 A74-13944 BARBER, H. R. Investigation of chemical APU application for small ground power sources 01 p0009 ¥74-10082 [AD-765724] BARBER, W. H. Solid state hydrogen gas generator 01 p0001 A74-11257 [AIAA PAPER 73-1232] BARR, B. G. Research on the application of satellite remote sensing to local, state, regional, and national programs involved with resource management and environmental quality 01 p0024 N74-14093 [NASA-CR-136472]

BECKERT, W. F. PERSONAL AUTHOR INDEX

BRCKERT, W. F.	Matrices for H3PO4 fuel cells
Solid state hydrogen gas generator [AIAA FAPEE 73-1232] 01 p0001 A74-11257	[AD-766312] 01 p0010 N74-10086 CASHION, N. B.
BENTALL, R. H.	Bitumen-bearing rocks
Current European developments in solar paddle drives	01 p0028 N74-15226
DERG, C. A. 01 p0014 N74-11672	CPGIRLSKI, J. E., JR. Low energy qas utilization in combustion gas turbine
Energy conservation through effective utilization	C1 p0029 N74-15447
[NBSIR-73-102] 01 p0027 N74-14688	CHAGUNAVA, V. T.
HERNATOWICZ, D. T. Hethod of making silicon solar cell array	Catalytic combustion of carbon monoxide in
[NASA-CASE-LEW-11069-1] 01 p0027 N74-14784	gasoline engine exhaust using manganese catalysts [AD-760395] 01 p0011 N74-10874
The NASA-levis terrestrial photovoltaics program	CLARK, A. P.
[MASA-TM-X-71491] 01 p0026 N74-14788 BIRNBERIER, H.	Solar ponds extended
A novel method of cooling semiconductor devices	[UCID-16317] 01 p0023 N74-13537 CLEMENT, J. D.
for power electronics	Satellite nuclear power station: An engineering
[BHFT-FE-T-73-02] 01 p0015 N74-11739 BLANK, L.	analysis
A hydrogen energy carrier. Volume 1: Summary	O1 p0002 A74-13234
[NASA-CR-135995] 01 p0014 N74-11727	Energy in transportation
A hydrogen energy carrier. Volume 2: Systems analysis	01 p0023 N74-13675
(NASA-CB-136007] 01 p0014 N74-11728	CCLE, R. Experimental two-phase liquid-metal
EOGDANOFF, D. W.	magnetohydrodynamic generator program
Impinging jet separators for liquid metal	[AD-766588] 01 p0013 N74-10952
magnetohydrodynamic power cycles [NASA-CR-136552] 01 p0027 N74-14785	COLLIES, R. J.
BOYLE, R. B.	An evaluation of the suitability of ERTS data for the purposes of petroleum exploration
The effect of fuel availability on future R and D	[E74-10029] 01 p0019 N74-12119
programs in power generation 01 p0031 N74-15689	COMTOIS, W. B.
BRANDHORST, B. W., JR.	The effect of fuel availability on future R and D programs in power generation
The multiple function edge illuminated solar cell	01 p0031 N74-15689
[NASA-TK-X-71476] O1 p0012 N74-10947 BRESNAHAM, D. L.	COOK, C. S.
Refan program. Phase 1: Summary report	Closed cycle MHD for central station power with fossil or nuclear fuels
[NASA-TH-X-71456] 01 p0009 N74-10043	[AD-766500] 01 p0012 N74-10949
BREWER, G. D. The case for hydrogen fueled to the second fueled to the seco	COX, R.
The case for hydrogen fueled transport aircraft [AIAA PAPER 73-1323] 01 p0002 A74-11315	A hydrogen energy carrier. Volume 1: Summary [MAS1+CR-135995] 01 n0014 N74-11727
BROCKMANS, C. B.	[MASA+CR-135995] 01 p0014 M74-11727 A hydrogen energy carrier. Volume 2: Systems
Petroleum exploration subprogram: Geological	analysis
interpretation of proportional imagery from ERTS-A satellite	[NASA-CR-136007] 01 p0014 N74-11728
[E74-10213] 01 p0028 N74-15020	CRIBBINS, P. D. The energy dilemma and its impact on air
BRCDER, J. D.	transportation
The use of FEP Teflon in solar cell cover technology [NASA-TM-X-71485] 01 p0012 N74-10944	[NASA-CR-135993] 01 p0015 N74-11743
Sethod of making silicon solar cell array	CULBERTSON, W. C. Oil shale
[NASA-CASE-LEW-11069-1] 01 p0027 N74-14784	01 p0029 N74-15260
BROGAM, T. R. Development of design criteria, cost estimates,	COTLER, W. H.
and schedules for an MHD high performance	Gas generators - A perspective [AIAA PAPER 73-1168] 01 p0001 A74-11219
demonstration experiment	CUTTING, J. C.
[AD-766232] 01 p0017 N74-11852 BROOKS, R. L.	Experimental two-phase liquid-metal
Applicability of Skylab remote sensing for	magnetohydrodynamic generator program [AD-766588] 01 p0013 N74-10952
detection and monitoring of surface mining	(-2 ,00000) (1 pop 13 p/4-10332
activities [274-10160] 01 p0024 p74-14028	D
BURNETT, J. E.	DAVIS, B. K.
Industrial use of aerospace technology	Solar energy power system
BUTIER, A. P., JE. 01 p0002 A74-12905	[NASA-CASE-MF5-21628-1] 01 p0025 N74-14496
Nuclear fuels: Uranium	DECASPERIS, A. J. The 1.5-kW fuel cell newerplant
01 p0028 N74-15257	The 1.5-kW fuel cell powerplant [AD-767302] 01 p0022 N74-12744
BDZNIKOV, A. R.	DENGEL, C. H.
Characteristics of a nonequilibrium MHD generator 01 p0005 A74-17439	Solid state hydrogen gas generator
T, F0003 274 17432	[AIAA PAPER 73-1232] 01 p0001 A74-11257 DIEHL, L. A.
C	Effect of water injection on mitric oxide
CADY, T.	emissions of a gas turbine combustor burning
A hydrogen energy carrier. Volume 1: Summary	natural cas fuel [NASA-TH-X-2959] 01 p0025 N74-14651
[NASA-CE+1359951 01 n0014 N74-11727	DIMITRIADES, B.
A hydrogen energy carrier. Volume 2: Systems analysis	The association of automotive fuel composition
[NASA-CR-136007] 01 p0014 N74-11728	With exhaust reactivity
CALMON, J.	
	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H.
Performance and noise aspects of supersonic transport	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H. Forecasting of technological progress for
tlansport	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H. Forecasting of technological progress for long-range planning of mining operations at coal
TEARSPORT 01 p0003 A74-13798	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. N. Forecasting of technological progress for long-range planning of mining operations at coal mines
TEANSPORT CABERGE, C. C. Peat	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H. Forecasting of technological progress for long-range planning of mining operations at coal mines 01 p0016 N74-11765 DUNCAN, D. C.
TRANSPORT CABEROS, C. C. Peat CASP, R. M. O1 p0003 A74-13798 O1 p0029 B74-15261	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H. Forecasting of technological progress for long-range planning of mining operations at coal mines 01 p0016 N74-11765 DUBCAN, D. C. Energy resources of the United States
TEARSPORT CABERGE, C. C. Peat 01 p0003 A74-13798 01 p0029 A74-15261	[PB-222609/0] 01 p0010 N74-10129 DOBROV, G. H. Forecasting of technological progress for long-range planning of mining operations at coal mines 01 p0016 N74-11765 DUNCAN, D. C.

DUNLOF, J. D. Chemical storage of hydrogen in Ni/H2 cells 01 p0004 A74-14	FORESTIERI, A. F. Bethod of making silicon solar cell array (MASA-CASE-LEW-11069-1) 01 p0027 N74-14784
DIEE, C. R.	FOSTER, W. G. Development program for a liquid methane heat pipe
The energy dilemma and its impact on air transportation [NASA-CR-135993] 01 p0015 N74-11	743 FRANS, A. P.
DYER, D. P. MHD for power generation: The view of a chosen f	Isotope kilowatt program ew [ORNL-TM-4243] 01 p0025 N74-14377
[AD-760342] 01 p0025 H74-14	
E	traffic control centers 01 p0019 N74-12636
BARL, 8. W.	PROEBLICE, A. J., JB. Power conditioning system for FAA Air Route
Chemical storage of bydrogen in Ni/H2 cells 01 p0004 A74-14	
BASTROND, R. J. Research on the application of satellite remote	0, page 4 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
sensing to local, state, regional, and national programs involved with resource management and	G
environmental quality [NASA-CB-136472] 01 p0024 N74-14	GAMMEL, G. 1093 A novel method of cooling semiconductor devices
ECCLESTON, 8. H. The association of automotive fuel composition	for power electronics [BMFT-FB-T-73-02] 01 p0015 k74-11739
with exhaust reactivity [PB-222609/0] 01 p0010 N74-10	GARRISON, G. W.
BHRICKE, K. A.	and schedules for an BHD high performance demonstration experiment
Use of Shuttle in establishing large space installations	[AD-766232] 01 p0017 H74-11852
01 p0004 A74-10 Regional and global energy transfer via passive power relay satellites	Alternative energy sources: A research challenge [CONF-730560-1] 01 p0024 N74-14097
01 p0005 A74-16	Satellite solar power stations to meet future
Theoretical performance of cylindrical parabolic solar concentrators	energy demands 01 p0001 A74-11020
01 p0001 A74-10	space power generation systems
Investigation of chemical APU application for small ground power sources	01 p0003 A74-14112
[AD-765724] 01 p0009 N74-10	
Outlook for energy in the United States to 1985 01 p0032 N74-1	[AD-766329] 01 p0013 N74-10951 6697 GOODMANSON, L. T.
BRIMEIER, R. Supersonic fuels from medium oils produced by the	Where are we headed in air transport? 01 p0020 M74-12669
thermal cracking of crude oil residues [DFVLE-SONDDR-301] 01 p0006 A74-1	GOULD, R. B.
ESCHER, W. J. D. Prospects for hydrogen as a fuel for	automobile thermal reactor [NASA-CR-134531] 01 p0019 E74-12447
transportation systems and for electrical power	
generation (ORML-TH-4305] 01 p0030 N74-1	
F	Outlook for energy in the United States to 1985 01 p0032 x74-15697
PERDEAR. S.	GUTHRIE, H. P.
The second fifteen years in space; Proceedings of the Eleventh Goddard Memorial Symposium,	reading list
Washington, D.C., March 8, 9, 1973 01 p0004 A74-1	(ORNL-EIS-73-65-REV-1) 01 p0022.N74-12695 GYPTOPOULOS, E. P.
FEEGUSON, B. L. The 1.5-kg fuel cell powerplant	Thermionic energy conversion. Volume I - Processes and devices
[AD-767302] 01 p0022 k74-1	
The jet engine design that can drastically reduc	e H
oxides of nitrogen [AIAA PAPER 74-160] 01 p0006 a74-1	8797 HANDLEY, L. M. Study of fuel cell system for powered balloon
PERRI, A., JE. Legal considerations and constraints on US nucle	ar [AD-766253] 01 p0009 N74-10083
policy [AD-754641] 01 p0024 p74-1	HAO, B. R. Experimental determination of dynamic
FINCH, W. I. Nuclear fuels: Uranium	characteristics of hydrogen oxygen fuel cell systems
01 p0028 N74-1	BART, R. Re, JR.
Natural gas as an automotive fuel, an experiment study	a1 The multiple junction edge illuminated solar cell [NASA-TH-X-71476] 01 p0012 N74-10947
[BH-RI-7806] 01 p0011 N74-1	
PLORES, C. V. Petroleum exploration subprogram: Geological interpretation of proportional inagery from	solar concentrators 01 p0001 A74-10026
ERTS-A satellite	HATSOPOULOS, G. B.
DATON D M	and devices 01 p0004 A74-14327
Research on electrochemical energy conversion systems	
(AD-7663291 01 p0013 x74-1	0951

WANCED T. C		TU.WAU U T	
The effect of fuel availability o	n future R and D	IVANOV, N. I. Forecasting of technological prog	ress for
programs in power deneration	01 p0031 N74-15689	long-range planning of mining of mines	perations at coal
HAIS, L. G. Liquid metal magnetohydrodynamics	(T.MNHI)		01 p0016 N74-11765
technology transfer feasibility		· J	
1: Summary [NASA-CR-136197]	01 p0023 N74-13466	JAHTZEN, B.	
Liquid metal magnetohydrodynamics technology transfer feasibility		Aviation fuels and lubricants	01 00006 879 40400
2: Appendixes	-	JOENS, M.	01 p0006 A74-18180
(NASA-CR-136198] HAZARD, H. R.	01 p0023 N74-13467	A novel method of cooling semicon for power electronics	ductor devices
Conversion of fuel nitrogen to NO combustor	x in a compact	[BMFT~FB-T-73-02] JOHNSON, J. E.	01 p0015 N74-11739
[ASHE PAPER 73-WA/GT-2] BEALY, T.	01 p0002 A74-13293	Storage and transportation of syn	
Electric energy requirements for o	environmental	report to the synthetic fuels p [ORNL-TH-4307]	anel 01 p0030 N74-15448
[CONF-730205-4] HEIDTHANN, G.	01 p0027 N74-14695	K	
A novel method of cooling semicon-	ductor devices	KANBBAECK, H.	
for power electronics {BHPT-FB-T-73-021	01 p0015 N74-11739	Combustion of the gases methane, ammonia in a mixing reactor	LP gas and
PEMPHILL, W. B. Quantification of the luminescence	a intensity of	[POA-1-C-1442-H3] KAS'IAHOV, V. A.	01 p0022 N74-12824
patural materials	01 p0005 A74-14892	On the theory of alternating-curr	ent
BERNE, R.	,	electrofluidăynamic converters	01 p0007 A74-18988
Recent developments in the field of power conversion and its possible.	le effects on	KRLLER, W. E. Cryogenic instrumentation at and	above liquid
power supply systems in space as	nd on earth 01 p0005 174-17195	hydrogen temperature - Present	and future 01 p0003 174-14057
HBNRY, H. R.		KELLY, T. J.	01 b0002 814-14021
	01 p0023 N74-13051	Solar power for our nation	01 p0004 A74-14465
BENRY, J. R. Design considerations for the air:	frame-integrated	KERN, J. Aviation fuels and lubricants	
scramjet [NASA-TM-x-2895]	.		01 p0006 A74-18180
HERBIE, E.	•	KINSHAM, F. R. BRTS-1 imagery use in reconnaissa	nce prospecting:
Development of geothermal reservo: over-pressured areas beneath the	irs from e Gulf coastal	Evaluation of the commercial ut imagery in structural reconnais	ility of ERTS-1
plain of Texas. A feasibility start production from everpressured re	tudy of power	minerals and petroleum	
[AD-766855]	01 p0018 N74-12183	[E74-10007] KIRBI, K. D.	01 p0013 N74-11148
HESSIN, T. D. Quantification of the luminescence	a intensity of	Satellite nuclear power station: analysis	An engineering
natural materials	01 p0005 A74-14892	KIRILLINA, V. A.	01 p0002 A74-13234
Electric energy requirements for a	anvironmental	Magnetohydrodynamic method of obt	aining electrical
protection		energy (collected articles) [AD-765933]	01 p0011 N74-10681
HOCH, R.	01 p0027 N74-14695	KIRILLOV, V. V. Characteristics of a nonequilibri	nn MHD generator
Performance and noise aspects of a transport	supersonic	KOESTLIN, H.	01 p0005 174-17439
	01 p0003 A74-13798	Present state of the art in condu	ctive coating
High voltage solar cell power gene	erating system	technology	01 p0006 A74-17654
for regulated solar array develo	opment 01 p0002 a74-12242	KOHL, R. C. Fabrication and testing of negati	vo-limited sealed
HOLY, Z. J. Energy situation and nuclear power		nickel-cadmium cells	
[NP-19838] BONIGSBAUM, P. R.	01 p0029 N74-15391	KOMAR, C. A.	01 p0009 N74-10078
The synchronous EFD device		Directional properties of coal an utilization in underground gasi	
HUBER, E. E.	01 p0024 ¥74-13759	erperiments [BM-TPR-73]	01 p0018 N74-12159
Energy research and development: reading list	A selected	KBASBOY, V. I.	•
[ORNL-EIS-73-65-REV-1] HUTCHINSON, V. V.	01 p0022 N74-12695	Optimization of the power of Para qenerators operating on nonequi	librium plasma
Selected list of Bureau of Mines	oublications on	KUSKO, A.	01 p0003 a74-13943
petroleum and natural gas, 1961- [BM-IC-8534]	-1970 01 p0032 N74-15691	Power conditioning system for FAA Traffic Control Centers	Air Route
HUTTER, U. Influence of wind frequency on rot	ational speed		01 p0004 A74-14133
adjustments of windmill generate [NASA-TT-F-15184]	rs	Power conditioning system for PAA traffic control centers	
1 NEG - 11-12-13 (1)	01 p0012 N74-10948		01 p0019 N74-12636
l		L	
ISHINO, M. Investigation of silicon photoelec	tric calle se	LACKBY, H. R.	13 6 3 61 4
precision photodetectors		Second iteration analysis of a for qas turbine-potassium-steam com-	bined cycle
[NRC-TT-1686]	01 p0010 N74-10199	[ORNL-NSF-EP-39]	01 p0019 N74-12577

PERSONAL AUTHOR INDEX

1970 -	HOCKOVCIAK, J., JR.
IBES, L. Time factors in slowing down the rate of growth of	Solar power for our nation
demand for primary energy in the United States	01 p0004 A74-14465
[EQL-7] 01 p0030 N74-15667	MOOZ, W. E. Energy trends and their future effects upon
LESEBBOOK, T. Study of application of ERTS-A imagery to	transportation
fracture-related mine safety hazards in the coal	rp-50461 01 p0017 N74-11791
mining industry	Energy policy research and the State of Florida
[E74-10083] 01 p0014 N74-11195 LEVERTOR, N. B.	NORRIS. D. W.
Refurbishment of solar simulation optical train	Energy demand and its effect on the ennvironment
mirror assemblies	[P-5048] 01 p0017 N74-11790
[NASA-CH-134123] 01 p0018 N74-12016	MORRIS, J. F. Figure-of-merit calculation methods for organic
LEVY, B., JR. High voltage solar cell power generating system	heat-pipe fluids
for regulated solar array development	[NASA-TH-X-2945] 01 p0015 N74-11736
[AIAA PAPER 73-1105] 01 p0002 A74-12242	MOFFLER, L. J. P. Geothermal resources
LEEBBEG, B. 1. Buission calculations for a scrapjet powered	01 p0028 N74-15240
hypersonic transport	NUROI, W.
(NASA-TM-X-71464) 01 p0018 N74-12445	Investigation of silicon photoelectric cells as precision photodetectors
Combustion of the gases methane, IP gas and	[NRC-TT-1686] 01 p0010 N74-10199
ammonia in a mixing reactor	MUERAY, D. C. Development program for a liquid methane heat pipe
[FOA-1-C-1442-H3] 01 p0022 N74-12824 LINDEN, H. B.	01 p0003 A74-14046
Review of world energy supplies	MUBRAY, R.
[IGU/A-1-73] 01 p0026 N74-14666	A hydrogen energy carrier. Volume 1: Summary [NASA-CR-135995] 01 p0014 #74-11727
IO, M. P. Time factors in slowing down the rate of growth of	[NASA-CR-135995] U1 public N/4-11/2/ A hydrogen energy carrier. Volume 2: Systems
demand for primary energy in the United States	analysis
[EQL-7] 01 p0030 N74-15667	[NASA-CR-136007] 01 p0014 N74-11728
LORAY, V. I.	N
Aviation gas turbine engines (selected portions) (AD-756810] 01 p0011 N74-10751	14
LUKSHA, B.	HIKOLARY, A. V.
Fabrication and testing of negative-limited sealed nickel-cadmium cells	Heating of a substance by an arc plasma 01 p0001 A74-10463
[NASA-CR-135981] 01 p0009 N74-10078	NOLAN, J. J.
	Development of design criteria, cost estimates,
M .	and schedules for an MND high performance demonstration experiment
MARSUTOVA, M. R.	(AD-766232] 01 p0017 N74-11852
Aviation das turbine engines (selected portions)	NORBOOD, G. A.
	Program research and development: A selected
[AD-756810] 01 p0011 N74-10751	Energy research and development: A selected reading list
[AD-756810] 01 p0011 N74-10751	Energy research and development: A selected
[AD-756810] 01 p0011 N74-10751 NALEVSKII, T. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam	Energy research and development: A selected reading list
[AD-756810] 01 p0011 N74-10751 NALEVSKII, Y. N. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] 01 p0010 N74-10084	Energy research and development: A selected reading list
[AD-756810] 01 p0011 N74-10751 NALEVSKII, T. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOF, J. C.
[AD-756810] 01 p0011 N74-10751 NALEVSKII, Y. N. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] 01 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion	Energy research and development: A selected reading list [ORNL-BIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium
[AD-756810] SALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10064 HALIUTA, D. D. Qualitative analysis of the efficiency of HHD energy conversion 01 p0003 A74-13944	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-ROSSRIBI, A.
[AD-756810] 01 p0011 N74-10751 NALEVSKII, I. N. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] 01 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion 01 p0003 A74-13944 NARCHIOHNA, N. B. Effect of water injection on nitric oxide	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSEINI, A. Solar heat utilization in residential heating
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgan [AD-756068] O1 p0010 N74-10084 NALIOTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion O1 p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIBI, A. Solar heat utilization in residential heating systems
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion O1 p0003 A74-13944 NARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIBI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEI, W. K., JR.
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion O1 p0003 A74-13944 MARCHIOHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] MARSTON. C. B.	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIBI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIOHNA, H. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 N74-14651 MARSTON, C. H. Closed cycle MHD for central station power with	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRINI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification
[AD-756810] MALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10084 MALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion O1 p0003 A74-13944 MARCHIONNA, H. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning matural gas fuel [NASA-TM-X-2959] O1 p0025 N74-14651 MARSTOW, C. B. Closed cycle MHD for central station power with fossil or nuclear fuels	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OWERBMI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of HHD energy conversion O1 p0003 A74-13944 HARCHIOHNA, H. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NSA-TH-X-2959] O1 p0025 N74-14651 HARSTON, C. B. Closed cycle HHD for central station power with fossil or nuclear fuels [AD-766500] HARTIN, A. B.	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSEIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their utilization in underground quasification experiments [DB-TPR-73] 01 p0018 N74-12159
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] O1 p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion O1 p0003 A74-13944 HARCHIOHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] O1 p0025 N74-14651 HARSTON, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] O1 p0012 N74-10949 HARTIN, A. B. Physical behaviour of some biowaste gases in an	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OWERBMI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgan [AD-756068] Ol p0010 N74-10084 NALIOTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TM-X-2959] Ol p0025 N74-14651 MARSTOM, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRINI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P.
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of bercury amalgan [AD-756068] Ol p0010 N74-10084 NALIGIA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 N74-14651 MARSTON, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their utilization in underground quasification experiments [AB-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgan [AD-75608] Ol p0010 K74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, M. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 R74-14651 MARSTOW, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OUSON, J. C. Nuclear fuels: Thorium Office pools N74-15258 OSTAD-BOSSEINI, A. Solar heat utilization in residential heating systems OUPO19 N74-12664 OVERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [DB-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of bercury amalgan [AD-756068] Ol p0010 N74-10084 NALIGIA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 N74-14651 MARSTON, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems O1 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their utilization in underground qasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W.
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASS-TH-X-2959] Ol p0025 N74-14651 MARSTOP, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OUSON, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-BOSSEINI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OWERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [DB-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIOHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NNSA-TH-X-2959] Ol p0025 N74-14651 MARSTOM. C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [ATAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZRIS, G. A. The use of FEF Teflon in solar cell cover technology	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems O1 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their utilization in underground qasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W.
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASS-TH-X-2959] Ol p0025 N74-14651 MARSTOP, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-BOSSEINI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OWERBEI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BH-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIOHNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning matural gas fuel [NNSA-TH-X-2959] Ol p0025 N74-14651 MARSTOM. C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [ATAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZARIS, G. A. The use of FEF Teflon in solar cell cover technology [NASA-TH-X-71485] Ol p0012 N74-10944 MCCOLLOH, T. H. Oil and gas	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIBI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 P PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PABCHEBRO, V. P. Qualitative analysis of the efficiency of BBD
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIOHNA, N. B. Effect of water injection on nitric oxide enissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 N74-14651 MARTOUGH, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [ATAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZZEIS, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] MCCULIOH, T. H. Oil and gas Ol p0029 N74-15259	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-BOSSEINI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OWERBEI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BH-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794
[AD-756810] NALEVSKII, Y. N. Possibility of commutating thermoelectric batteries with the aid of bercury amalgan [AD-756068] Ol p0010 N74-10064 NALIBIA, D. D. Qualitative analysis of the efficiency of HHD energy conversion Ol p0003 A74-13944 HARCHIONNA, N. B. Effect of water injection on mitric oxide emissions of a gas turbine combustor burning natural gas fuel [NSA-TH-X-2959] Ol p0025 N74-14651 HARSTON, C. B. Closed cycle HHD for central station power with fossil or nuclear fuels [AD-766500] Ol p0012 N74-10949 HARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AITA PAPER 73-1113] Ol p0001 A74-10691 HARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 HAZARIS, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] BCCOLLOH, T. H. Oil and gas Ol p0002 N74-15259 BCHORTEY, G. J. Interdisciplinary applications and interpretations	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIBI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 P PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PAIZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PARCHERO, V. P. Qualitative analysis of the efficiency of BBD energy conversion 01 p0003 A74-13944
MALBUSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of bercury amalgan [AD-756068] 01 p0010 N74-10084 MALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion 01 p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] 01 p0025 N74-14651 MARSTON, C. H. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] 01 p0012 N74-10949 MARTIN, A. B. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] 01 p0001 A74-10691 MABTIN, C. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 MAZARIS, G. A. The use of FEF Teflon in solar cell cover technology [NASA-TH-X-71485] 01 p0012 N74-10944 MCCOLLIOH, T. H. Oil and gas 01 p0029 N74-15259 MCMOURTRY, G. J. Interdisciplinary applications and interpretations of PPTS data within the Susquehanna River Basin	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBMI, H. K., JR. Directional properties of coal and their utilization in underground gasification experiments [DB-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning development and use of energy systems [JFRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PANCHENKO, V. P. Qualitative analysis of the efficiency of BHD energy conversion 01 p0003 A74-13944 PARENTE, R. B. Power source quality
MALBUSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgan [AD-756068] 01 p0010 N74-10084 MALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion 01 p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] 01 p0025 N74-14651 MARSTOM, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] 01 p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] 01 p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 MAZARIS, G. A. The use of FEF Teflon in solar cell cover technology [NASA-TH-X-71485] 01 p0012 N74-10944 MCCOLLIOH, T. H. Oil and gas 01 p0029 N74-15259 MCCOLLIOH, T. H. Oil and qas Un p0029 N74-15259 MCMURTEY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution)	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBAY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PABCHEBRO, V. P. Qualitative analysis of the efficiency of BBD energy conversion 01 p0003 A74-13944 PARENTE, R. B. Power source quality 01 p0019 N74-12635
MALBUSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgan [AD-756668] 01 p0010 N74-10084 MALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion 01 p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TM-X-2959] 01 p0025 N74-14651 MARSTOM, C. H. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] 01 p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] 01 p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 MAZARIS, G. A. The use of FEF Teflon in solar cell cover technology [NASA-TM-X-71485] 01 p0012 N74-10944 MCCOLLIOH, T. H. Oil and gas 01 p0029 N74-15259 MCMURTRY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061]	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBMI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BM-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PAIZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PANCHENKO, V. P. Qualitative analysis of the efficiency of BHD energy conversion 01 p0003 A74-13944 PARENTE, R. B. Power source quality 01 p0019 N74-12635 PASINI, J., III Directional properties of coal and their
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 M74-10084 NALIDIA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, M. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 M74-14651 MARSTOW, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] Ol p0012 N74-10949 MARTIN, A. B. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZARIS, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] MCCOLLOH, T. H. Oil and gas Ol p0029 N74-15259 MCMORTEY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061] ESISEMBURG, E. Supersonic fuels from medium oils produced by the	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBAY, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PABCHEBRO, V. P. Qualitative analysis of the efficiency of BBD energy conversion 01 p0003 A74-13944 PARENTE, R. B. Power source quality 01 p0019 N74-12635
[AD-756810] NALEVSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-75608] Ol p0010 N74-10084 NALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] Ol p0025 N74-14651 MARTON, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [ATAA PAPER 73-1113] Ol p0001 A74-10691 MARTIN, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZZELS, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] MCCULLOH, T. H. Oil and gas Ol p0029 N74-15259 MCCULLOH, T. H. Cil and qas Ol p0029 N74-15259 MCMUTTEY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061] MEISENHURG, E. Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. O1 p0019 N74-15264 OVERBEI, B. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning development and use of energy systems [JERS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PARENTE, R. B. Power source quality 01 p0019 N74-12635 PASINI, J., III Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159
MALBUSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of mercury amalgam [AD-756068] Ol p0010 M74-10084 MALIUTA, D. D. Qualitative analysis of the efficiency of MHD energy conversion Ol p0003 A74-13944 MARCHIGHNA, M. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NASA-TH-X-2959] MARSTOW, C. B. Closed cycle MHD for central station power with fossil cr nuclear fuels [AD-766500] MARTIW, A. R. Physical behaviour of some biowaste gases in an ion engine [AIAA PAPER 73-1113] Ol p0001 A74-10691 MARTIW, C. Actual state of French technical developments concerning sources of space power Ol p0002 A74-12794 MAZARIS, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] MCCOLLOH, T. H. Oil and gas Ol p0029 N74-15259 MCMORTRY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061] MEISEMBURG, E. Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues [DFYLB-SUNDDR-301] VALUELLY A. A. No of p0006 A74-18925	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-BOSSEIMI, A. Solar heat utilization in residential heating systems 01 p0019 N74-12664 OVERBEI, W. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BH-TPR-73] 01 p0018 N74-12159 PADALKO, L. P. Hathematical methods of optimal planning development and use of energy systems [JPRS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PARCHEBRO, V. P. Qualitative analysis of the efficiency of BBD energy conversion 01 p0003 A74-13944 PARENTE, R. B. Power source quality 01 p0019 N74-12635 PASINI, J., III Directional properties of coal and their utilization in underground gasification experiments [BB-TPR-73] 01 p0018 N74-12159
MALBUSKII, Y. W. Possibility of commutating thermoelectric batteries with the aid of bercury amalgan [AD-756068] 01 p0010 N74-10064 MALIUTA, D. D. Qualitative analysis of the efficiency of HHD energy conversion 01 p0003 A74-13944 MARCHIONNA, N. B. Effect of water injection on nitric oxide emissions of a gas turbine combustor burning natural gas fuel [NSA-TH-X-2959] 01 p0025 N74-14651 MARSTON, C. B. Closed cycle HHD for central station power with fossil cr nuclear fuels [AD-766500] 01 p0012 N74-10949 MARTIN, A. R. Physical behaviour of some biowaste gases in an ion engine [AIIA PAPER 73-1113] 01 p0001 A74-10691 MABTIN, C. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 MAZRES, G. A. The use of FEP Teflon in solar cell cover technology [NASA-TH-X-71485] 01 p0012 N74-10944 MCCOLLOH, T. H. Oil and gas 01 p0029 N74-15259 MCMORTHY, G. J. Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [E74-10061] 01 p0013 N74-11182 MRISHNUBG, E. Supersonic fuels from medium oils produced by the thermal cracking of crude oil residues [DFVIR-SONDDR-301] 01 p0006 A74-18925	Energy research and development: A selected reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 OLSOH, J. C. Nuclear fuels: Thorium 01 p0029 N74-15258 OSTAD-HOSSRIMI, A. O1 p0019 N74-15264 OVERBEI, B. K., JR. Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159 PADALKO, L. P. Mathematical methods of optimal planning development and use of energy systems [JERS-60546] 01 p0022 N74-12693 PALZ, W. Actual state of French technical developments concerning sources of space power 01 p0002 A74-12794 PARENTE, R. B. Power source quality 01 p0019 N74-12635 PASINI, J., III Directional properties of coal and their utilization in underground gasification experiments [BE-TPE-73] 01 p0018 N74-12159

PECK, D. L.	ROM, F. E.
Assessment of quothermal energy resources 01 p0030 N74-15	Summary of the study of disposal of puctoar wasta
PRNHEWELL, J. D. Applicability of Skylab remote sensing for detection and monitoring of surface mining	01 p0005 A74-16123 Assessment of lightweight mobile nuclear power systems
activities [E74-10160] PBBALTA, B. The refining of turbine fuels by modern	[NASA-TM-X-68290] 01 p0011 N74-10754
hydrotreating	ROSA, R. J. Satellite nuclear power station: An engineering
PESCHRA, W.	01 p0002 A74-1323g
Energy supply and energy transformers in satellites and spacecraft	BOUX, M. Energy: Compiled bibliography and tables of world
PETERSEN, G. W. 01 p0006 A74-18	resources, consumption, and wastes [LBP-63/73] 01 p0010 N74-10391
Interdisciplinary applications and interpretations of ERTS data within the Susquehanna River Basin (resource inventory, land use, and pollution) [874-10061] 01 p0013 874-11	s RUSSELL, 0. B. Study of application of BETS-A imagery to fracture-related mine safety bazards in the con-
PETERSOF, J. T. Applications of meteorology to natural resource	(874-10083) 01 p0014 N74-11195
planning 01 p0014 k74-11:	sas S
PETBOSYARTS, A. H.	SALLES, Y.
Self-contained low power atomic plants [AD-766969] 01 p0014 N74-11	Photosensitive elements for solar sensors 01 p0005 A74-17296
Prom scientific research to the atomic industry [JPRS-60584] 01 p0023 N74-134	SANS, B. W.
PRITICERS, B. W. Exploratory development of a glass ceramic	[NASA-TH-X-71456] 01 p0009 N74-10043
automobile thermal reactor [NASA-CB-134531] 01 p0019 N74-120	Isotope kilowatt program
PHEN, R. L. Liquid metal magnetohydrodynamics (LMNHD)	SATER, B. Y.
technology transfer feasibility study. Volume 1: Summary	The multiple junction edge illuminated solar cell [NASA-TM-X-71476] 01 p0012 N74-10947 SAUBBERS, D. P.
Liquid metal magnetohydrodynamics (LMMHD)	Evaluation of the commercial utility of ERTS-1
technology transfer feasibility study. Volume 2: Appendixes	1Magery in structural reconnaissance for pinerals and petroleum
[NASA-CE-136198] 01 p0023 N74-134	67 [E74-10007] 01 p0013 H74-11148 SAVAGE, R. L.
0il shale 01 p0029 974-152	A hydrogen energy carrier. Volume 1. Summary
PITTREGER, L. C. Experimental two-phase liquid-metal	A hydrogen energy carrier. Volume 2: Systems analysis
magnetohydrodynamic generator program (AD-766588) 01 p0013 N74-109	[NASA-CR-136007] 01 p0014 N74-11728
FUCHKOV, N. G. Commerical petroleum products, properties and	The hydrogen fuel economy and aircraft propulsion [AIAA PAPER 73-1319] 01 p0006 A74-17905
applications [AD-754703] 01 p0010 N74-101	SCHAIDT. H. J.
R	and schedules for an MHD high performance
RAIBLE, C. J.	demonstration experiment [AD-766232] 01 p0017 N74-11852
The association of automotive fuel composition	SCHOKIN, O. F The history of technology and engineering solutions
with exhaust reactivity [PB-222609/0] 01 p0010 N74-101	N1 m0016 W74-11760
BEINIG, L. P. Some interfaces in resource utilization	Blectric vehicle battery research and development [NASA-TM-Y-714713 01 n0012 N74-10946
[LA-UR-73-570] 01 p0022 N74-126	96 SCHWEINFURTH, S. P. Bnergy resources of the United States
Vitreous oxide antireflection films in high-efficiency sclar cells	[CIRC-650] 01 p0031 N74-15685 SHEIDLINA, A. E.
BICHARDSON, R. L. 01 p0004 A74-142	50 Bagnetohydrodynamic method of obtaining electrical
The refining of turbine fuels by modern hydrotreating	energy (collected articles) [AD-765933] 01 p0011 N74-10681
[ATAA PAPER 74-162] 01 p0006 A74-187	SHELTON, E. M. 98 Aviation turbine fuels, 1972
The multiple junction edge illuminated solar cell	01 p0014 g74-11592
[NASA-TH-X-71476] 01 p0012 N74-109 RIORDAM, B. H. Vapor generator feed pump for Rankine cycle	Trends in the mechanization of the coal industry and quarantee of patent-ability of designs that are competitive on the world technological level
automotive propulsion system (Chandler Evans) (PB-222849/2) 01 p0011 N74-107 ROBIEDX, J.	01 p0016 N74-11759
Evolution of studies in the field of gas lasers 01 p0005 A74-169	s⊎itching of silicon germaninm allow
Technological problems with large-area solar cell	[AD-765845] 01 p0009 N74-10080 SIRCOFF, H. Z.
arrays [DGLE FAPER 73-107] 01 p0005 a74-172	The energy dilemma and its impact on air
	04 transportation [NASA-CR-135993] 01 p0015 N74-11743

PERSONAL AUTHOR INDEX

SMIBBOV, L. P. Porecasting of technological proq- long-range planning of mining o mines		TSE, A. H. Si-Au Schottky barrier nuclear battery [TID-26342] 01 p0017 N74-11851
•	01 p0016 N74-11765	U
SPARLING, E. C. Outlook for energy in the United	States to 1985 01 p0032 N74-15697	ULINICH . F. R. Qualitative analysis of the efficiency of MHD
SPENGLER, G. Aviation fuels and lubricants		energy conversion 01 p0003 A74-13944
	01 p0006 A74-18180	V
STARTS, M. B. Nuclear fuels: Thorium		Y
STADELHABB, 6. Gas-beated 'heat pipe' vacuum fur	01 p0029 N74-15258	VANIE, V. E. Characteristics of a nonequilibrium MHD generator 01 p0005 A74-17439
STRIBER, J. P.	01 p0007 A74-19724	VABLEBRER, E. Aviation needs and public concerns 01 p0027 N74-14749
The technology and economics of c airplane design. I	ommercial	VARGAS P., C.
STOFEL, B4	01 p0001 A74-10144	Oil exploration subprogram geological interpretation of images provided by the ERTS-A
Spacecraft electrical power STOLL, R.	01 p0002 A74-12201	satellite [NASA-TI-P-15265] 01 p0028 N74-15070 VOROB'EV, V. S.
Thermoelectric qenerators	01 p0002 A74-13448	Optimization of the power of Faraday BBD generators operating on nonequilibrium plasma 01 p0003 A74-13943
STRUNKIE, V. A. Aviation que turbine engines (sel		
[AD-756810] STURN, G. P., JR.	01 p0011 N74-10751	W
The association of automotive fue with exhaust reactivity	l composition	WALKER, R. D., JR. Mass transfer in fuel cells
[PB-222609/0] SWEET, D. C.	01 p0010 N74-10129	[NASA-CR-134519] 01 p0009 N74-10075
Relevance of ERTS to the State of [E74-10024] SEEGO. G. C.	01 p0013 N74-11159	Research on the application of satellite remote sensing to local, state, regional, and national programs involved with resource management and
The U.S. energy problem. Volume part A		environmental quality [NASA-CR-136472] 01 p0024 N74-14093
[PB-207518] The U.S. energy problem. Volume part B	01 p0017 N74-11795 2: Appendices,	WATSON, B. D. Quantification of the luminescence intensity of natural materials
[PB-207519]	01 p0017 n74-11796	01 p0005 274-14892
T		#uclear fuels: Uranium 01 p0028 N74-15257
TALLEY, W. W., II Manerqy: An energy management mo	dol of the United	WHITTLE, G. P. Investigations using data in Alabama from EFTS-A
States for the prediction of en resource consumption, environment	ergy demand,	[E74-101241 01 p0023 N74-13051 WIBR, Ca Ba
assessment of new technology, a resource alternatives	nd energy	Study of application of ERTS-A imagery to fracture-related mine safety hazards in the coal
TERABE, M.	01 p0026 N74-14665	mining industry [E74-10083] 01 p0014 b74-11195
Present air pollution situation i and future countermeasures	n Kawasaki city	WILLIAMS, J. R. Satellite nuclear power station: An engineering
(KS-27] THEOBALD, P. K.	01 p0018 N74-12321	analysis 01 p0002 A74-13234
Energy resources of the United St		WILLIAMS, R. D.
[CIRC-650] THOMAS, G. PRTS-1 imagery use in reconnaissa	01 p0031 N74-15685	A hydrogen energy carrier. Volume 1: Summary [NASA-CR-135995] A hydrogen energy carrier. Volume 2: Systems
Evaluation of the commercial ut imagery in structural reconnais	ility of ERTS-1	analysis [NASA-CR-136007] 01 p0014 N74-11728
minerals and petroleum [E74-10007]	01 p0013 974-11148	GILLIAMS, R. S., JR. Satellite geological and geophysical remote sensing of Iceland
Solar energy to meet the nation's [NASA-TH-X-68290]	energy needs 01 p0011 N74-10754	[E74-10073] 01 p0014 N74-11188
TILLAN, E. S., JB. Hydrogen generator		Outlook for energy in the United States to 1985 01 p0032 #74-15697
[AD-767402] TIMBEBHAUS, R. D. Cryoqenic Engineering Conference,	01 p0024 N74-13766 University of	wobbee, F. J. Study of application of ERTS-A imagery to fracture-related mine safety bazards in the coal
Colorado, Boulder, Colo., Augus Proceedings		mining industry [E74-10083] 01 p0014 N74-11195
TROUT, A. M.	01 p0003 a74-14043	Y
Effect of water injection on nitrender emissions of a gas turbine comb	cic oxide	YANG, Y. Y.
emissions of a das turbine community of the community of	01 p0025 N74-14651	Satellite nuclear power station; An engineering analysis
TSCHAFTZ, B. A. Strip-mined watershed hydrologic	•	01 p0002 174-13234
study		
[PB-223558/8GA]	01 p0025 x74-14105	•

ZAUDERER, B. PERSONAL AUTHOR INDEX

7

ZAUDERRE, B.

Closed cycle BHD for central station power with
fossil or nuclear fuels
[AD-766500]
Investigation of a non-equilibrium BHD generator
[AD-766493]
Ol p0013 N74-10950
ZBB, Ca-B.

Effect of the sun, the moon and solar radiation
pressure on a near-equatorial synchronous
satellite
Ol p0003 A74-13559
ZHIRITSKII, G. S.
Aviation gas turbine engines (selected portions)
[AD-756810]
Ol p0011 N74-10751
ZBAKET, C. A.

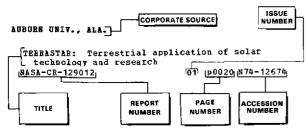
Energy, resources and the environment
[N72-180-REV-1]
Outlock for energy in the United States to 1985
Ol p0032 N74-15697

CORPORATE SOURCE INDEX

ENERGY / A Continuing Bibliography (Suppl. 01)

MAY 1974

Typical Corporate Source Index Listing



The title of the document is used to provide a brief description of the subject matter. The issue, page number and NASA or IAA accession number are included in each entry to assist the user in locating the abstract in the abstract section of an individual supplement of Energy. If applicable, a report number is also included as an aid in identifying the document.

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO. Magnetohydrodynamic method of obtaining electrical energy (collected articles) 01 p0011 H74-10681 f AD-7659331 Ap-765943| Aviation gas turbine engines (selected portions) 01 p0011 874-10751 [AD-756810] Self-contained low power atomic plants
fab-7669691 01 p0014 N74-11519 ALABAMA UNIV., UNIVERSITY.
Investigations using data in Alabama from ERTS-A
[E74-10124]
O1 p0023 N74-130 01 p0023 N74-13051 AMERICAN UNIV., WASHINGTON, D.C. Research on electrochemical energy conversion systems [AD-766329] 01 p0013 N74-10951 ARGONNE NATIONAL LAB., ILL. Experimental two-phase liquid-metal perimental two-phase liquid magnetobydrodynamic generator program 01 p0013 N74-10952 [AD-766588] ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTES VILLE, VA. State of developments and research problem on the switching of silicon germanium alloy thermoelectric elements Possibility of commutating thermoelectric batteries with the aid of mercury amalgam (AD-75068) 01 p0009 N74-10080 01 p0010 N74-10084 Conmerical petroleum products, properties and applications 01 p0010 N74-10128 [AD-754703] Catalytic combustion of carbon monoxide in gasoline engine exhaust using manganese catalysts 01 p0011 N74-10874 Significant research results for 1971, Bigh Temperature Institute, USSR Academy of Sciences [AD-765753] 01 p0012 N74-10898), INC., ARNOLD AIR FORCE STATION, TENN.
Development of design criteria, cost estimates, and schedules for an MBD high performance demonstration experiment 01 p0017 N74-11852 [AD-766232] ATOMIC ENERGY COMMISSION, WASHINGTON, D.C. Energy H and D inventory data base. Bibliography, 1973 01 p0017 N74-11849 AUBURN UNIV., ALA.
TERRASTAR: Terrestrial application of solar
technology and research 01 p0020 N74-12674 [NASA-CR-129012] Energy consumption: Past, present, future 01 p0020 N74-12675 Energy and resource consumption 01 p0020 N74-12676 Energy resources 01 p0020 N74-12677 Components for solar energy 01 p0020 N74-12678 Solar heating and cooling buildings 01 p0020 N74-12679 Solar power generation and distribution 01 p0021 #74-12680 National energy policy 01 p0021 N74-12681 Solar energy potential 01 p0021 874-12682 Impacts of solar energy utilization 01 p0021 N74-12683 Market potential for solar heating and cooling 01 p0021 N74-12684 Strategy for solar heating and cooling in huildings 01 p0021 #74-12685 В BORING COMMERCIAL AIRPLANE CO. SEATTLE, WASH. Where are we headed in air transport? BROWN, BOYERI GED CIE, A.G., HEIDELBERG (WEST GERMANY). A novel method of cooling semiconductor devices

01 p0020 #74-12669 for power electronics [BMFT-FB-T-73-02] 01 p0015 N74-11739 BURBAU OF MINES, BARTLESVILLE, OKLA. Natural cas as an automotive fuel, an erperimental study 01 p0011 N74-10715 r BM-RI-7806 1 Aviation turbine fuels, 1972 01 p0014 N74-11592 Selected list of Bureau of Mines publications on petroleum and natural qas, 1961-1970 01 p0032 N74-15691 BH-IC-8534) BUREAU OF MIMES, MORGANTONN, W.VA.
Directional properties of coal and their utilization in underground gasification experiments [BM-TPR-73] 01 p0018 N74-12159 BUREAU OF MINES, WASHINGTON, D.C. The association of automotive fuel composition with exhaust reactivity 01 p0010 N74-10129 [PB-222609/0] CALIFORNIA INST. OF TECH., PASADENA.
Time factors in slowing down the rate of growth
of demand for primary energy in the United

[EQL-7] 01 p0030 N74-15667 CALIFORNIA UNIV., BERKELBY. LANGENCE BERKELBY LAB. Calculations on a solar energy system

On p0023 N74-13538 [LBL-1773]

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Solar ponds extended
[UCID-16317]
CHARLED DAMAS CHANDLER EVANS, INC., WEST HARTPORD, CONN.
Vapor generator feed pump for Rankine cycle

automotive propulsion system (Chandler Evans) 01 p0011 N74-10747 [PB-222849/2]

CHASE MANHATTAR BANK, MEW YORK. Outlook for energy in the United States to 1985	
01 p0032 N74-15697	
CITIZENS' ADVISORY COMMITTEE ON ENVIRONMENTAL	EARTH SATELLITE COR
QUALITY, WASHINGTON, D.C. Report to the president and to the council on	Study of applicate fracture-relate
environmental quality	coal mining in
01 p0024 N74-14094	[274-10083]
COMMISSION OF THE EUROPEAN COMMUNITIES, BRUSSELS	BASON OIL CO., OKLAN
(BELGIUM). The energy situation in the community, situation	An evaluation of for the purpose
1972, forecasts 1973	[274-10029]
01 p0030 N74-15679	ECOLE POLYTECHNIQUE
COMMITTEE ON BANKING AND CORRENCY (U.S. HOUSE). EPA pollution regulations and fuel shortage: The	(SWITZERLAND). Energy: Compile:
impact on mass transit	world resource:
01 p0027 N74-14690	[LRP-63/73]
COMMITTEE ON COMMERCE (U. S. SENATE).	ENERGY RESEARCH COR
Energy research and development, 2 01 p0027 N74-14692	Electrolyte for A
National Puels and Energy Conservation Act of 1973	Matrices for HJP
rs-repr-93-5261 01 p0027 N74-14693	[AD-766312]
COMMITTEE ON GOVERNMENT OPERATIONS (U. S. HOUSE).	Hydrogen generate
Conservation and efficient use of energy, part 1 01 p0030 N74-15682	[AD-767402] ENVIRONMENTAL PROTE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U. S.	PARK, N.C.
SEBATE).	The association
Factors affecting the use of coal in present and	with exhaust re
future energy makers 01 p0031 N74-15684	[PB-222609/0] Applications of
Legislative authority of Federal agencies with	planning
respect to fuels and energy: A staff analysis	
01 p0031 N74-15686 The President's energy message and S. 1570	EUROPEAN SPACE RESE. NOORDWIJK (NETHERLA)
01 p0031 N74+15687	Current European
Summary of the energy conservation and	drives
development recommendations contained in the	
final report of the National Commission on Materials Policy, June 1973: A background paper	
01 p0031 N74-15688	
Energy conservation, part 1	PEDERAL AVIATION AD
O1 p0031 N74-15690 CONMITTEE ON SCIENCE AND ASTRONAUTICS (U. S. HOUSE).	Power conditioning traffic control
Energy research and development and space	trairie contro.
technology	PLORIDA UNIV., GAIN
01 p0012 N74-10892 Solar energy for the terrestrial generation of	Mass transfer in
electricity	(NASA-CH-13451
01 p0012 N74-10896	
Solar-energy for heating and cooling	
01 p0016 N74-11787 Bnergy research and development: An overview of	GENERAL BLECTRIC CO. Closed cycle MHD
our national effort	fossil or nucl
01 p0016 N74-11788	[AD-766500]
University energy research centers	Investigation of
01 p0019 874-12668 Energy facts	[AD-766493] GEOLOGICAL SURVEY,
01 p0020 N74-12672	Satellite geolog:
The Federal Government and energy: R and D	sensing of Ice
bistorical background	[274-10073]
01 p0021 N74-12687 An inventory of energy research, volume 1	Bitumen-bearing
01 p0021 N74-12688	Coal
An inventory of energy research, volume 2	
01 p0021 N74-12689 Short term energy shortages	Geothermal resour
01 p0021 N74-12690	Nuclear fuels:
Energy research and development and space	
technology 01 p0022 k74-12691	Nuclear fuels:
Individual action for energy conservation	Oil and gas
01 p0030 N74-15680	722 423
Conservation and efficient use of energy, part 1	Oil shale
O1 p0030 N74-15682 COUNCIL ON ENVIRONMENTAL QUALITY, WASHINGTON, D.C.	Peat
Energy and the environment: Electric power	reat
[PB-223326/0GA] 01 p0028 N74-14791	Energy resources
_	[CIRC-650]
D	GOULD, INC., MENDOT. Fabrication and
DARTHOUTH COLL., HANOVER, N.H.	sealed nickel-
Si-Au Schottky barrier nuclear battery	[NASA-CR-13598
[TID-26342] 01 p0017 N74-11851 DBUTSCHE PORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT-	
UND RAUMFAHHT, PORZ (WEST GERMANI).	
Section 4: Propulsion and energy	BOUSTON UNIV., TEX.

01 p0026 N74-14671

F

P., WASHINGTON, D.C. tion of ERTS-A imagery to ed mine safety hazards in the dustry 01 p0014 N74-11195 O1 p0014 N/4-11155 HOMA CITY, OKLA. the suitability of ERTS data es of petroleum exploration O1 p0018 N74-12119 PEDERALE DE LAUSANNE d bibliography and tables of s, consumption, and wastes 01 p0010 N74-10391 P., BETBEL, CONN. bydrocarbon air fuel cells 01 p0010 N74-10085 04 fuel cells 01 p0010 N74-10086 or 01 p0024 N74-13766 CTION AGENCY, RESEARCH TRIANGLE of automotive fuel composition eactivity 01 p0010 N74-10129 meteorology to natural resource 01 p0014 N74-11395 ARCH AND TECHNOLOGY CENTER, NDS). developments in solar paddle 01 p0014 N74-11672 F MINISTRATION, WASHINGTON, B.C. ng system for FAA air route 1 centers 01 p0019 N74-12636 ESVILLE. fuel cells 01 p0009 N74~10075 G)., PHILADELPHIA, PA.) for central station power with ear fuels 01 p0012 N74-10949 a non-equilibrium MRD generator 01 p0013 N74-10950 WASHINGTON, D.C. ical and deophysical remote land 01 p0014 N74-11188 rocks 01 n0028 N74-15226 01 p0028 N74-15230 rces 01 n0028 N74-15240 Oraniom 01 p0028 N74-15257 Thorium 01 p0029 N74-15258 01 p0029 N74-15259 01 p0029 N74-15260 01 p0029 N74-15261 of the United States 01 p0031 N74-15685 A HBIGHTS, MINN.
testing of negative-limited
cadmium cells 01 p0009 N74-10078

BOUSTON UBIV., TEX.
A hydrogen energy carrier. Volume 1: Summary
[NASA-CR-135995] 01 p0014 N74-11727

CORPORATE SOURCE INDEX

RANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
Research on the application of satellite remote
sensing to local, state, regional, and
national programs involved with resource A hydrogen energy carrier. Volume 2: Systems analysis 01 p0014 N74-11728 [NASA-CR-136007] Summary of systems analysis of hydrogen as an management and environmental quality [NASA-CR-136472] 01 p00 energy carrier in the United States 01 p0024 N74-14093 01 p0015 N74-11729 Current energy shortage in the United States 01 p0015 974-11730 Production of hydrogen LIBRARY OF CONGRESS, WASHINGTON, D.C. 01 p0015 N74-11731 Energy facts The Federal Government and energy: R and D Transmission and storage of hydrogen 01 p0015 N74-11732 Safety, legal, environmental, economic, historical background political, and social aspects of hydrogen 01 p0015 N74-11734 01 p0021 N74-12687 Pactors affecting the use of coal in present and Implementation of a hydrogen energy carrier system future energy makers 01 p0015 N74-11735 01 p0031 N74-15684 Summary of the energy conservation and development recommendations contained in the final report of the National Commission on INDIANA GEOLOGICAL SURVEY, BLOOMINGTOR.
Study of application of ERTS-A imagery to
fracture-related mine safety hazards in the coal mining industry
[E74-10083] 01 p001INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL. 01 p0014 874-11195 [NASA-TT-F-15184] 01 p0012 N74-10 LOCKHEED MISSILES AND SPACE CO., SUNBYVALE, CALIF-Testing for thermal fatigue failures in solar 01 p0012 N74-10948 Review of world energy supplies 01 p0026 N74-14666 [IGU/A-1-73] 01 p0026 N74-INSTITUTE OF TRANSPORT AVIATION, PARIS (FRANCE). arrays Aviation needs and public concerns 01 p0010 874-10240 01 p0027 N74-14749 LOS ALAMOS SCIENTIFIC LAB., B. BEX.
Some interfaces in resource utilization
[LA-UR-73-570] 01 p002: INTERIOR DEPT., WASHINGTON, D.C.

Pederal agency energy conservation

C1 p0026 N74-14686 01 p0022 N74-12696 rederal energy conservation 01 p0026 N74-14687 MARYLAND UNIV., COLLEGE PARK.
An assessment of solar energy as a national Assessment of geothermal energy resources 01 p0030 N74-15661 INTERTECHNOLOGY CORP., WARRENTON, VA. energy resource The U.S. energy problem. Volume 2: Appendices, 01 p0019 N74-12462 [NASA-CR-136191] Proceedings of the Solar Heating and Cooling for Buildings Workshop. Part 1: Technical 01 p0017 N74-11795 [PB-207518] The U.S. energy problem. Volume 2: Appendices, sessions, March 21 and 22 [PB-223536/46A] 01 p00
HICHIGAN UNIV., ANN ARBOR.
Experimental determination of dynamic 01 p0025 N74-14499 01 p0017 N74-11796 PB-2075191 characteristics of hydrogen oxygen fuel cell J JET FROPULSION LAB., CALIF. INST. OF TECH., PASADERA.
Liquid metal magnetohydrodynamics (LMMHD)
technology transfer feasibility study. Volume systems 01 p0009 N74-10074 MITRE CORP., MCLEAN, VA.
Energy, resources and the environment
[M72-180-REV-1] 01 p0 01 p0032 N74-15695 1: Summary 01 p0023 N74-13466 [NASA-CR-1361971 Liquid metal magnetohydrodynamics (LMBHD) technology transfer feasibility study. Volume Ν 2: Appendixes NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH HATIONAL ACADEMI OF SCIENCES
COUNCIL, WASHINGTON, D.C.
Substitute catalysts for platinum in automobile
enission control devices and petroleum refining
01 p0018 N74-11941 01 p0023 N74-13467 [NASA-CR-136198] Impinging jet separators for liquid metal magnetohydrodynamic power cycles

[Nash-CR-136552] 01 p0027 N74-14785 (NASA-CR-136552) 01 p0027 N74-147
JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA. Trends in the mechanization of the coal industry and quarantee of patent-ability of designs that are competitive on the world technological level NATIONAL ARBONAUTICS AND SPACE ADMINISTRATION. NATIONAL ARROHAUTES AND SPACE ARROHAUTES AND LANGLEY STATION, VA. Design considerations for the airframe-integrated scramjet
[HASA-TH-X-2895] 01 p0019 N7
HATIONAL ARRONAUTICS AND SPACE ADMINISTRATION. 01 p0019 N74-12448 01 p0016 N74-11759 The history of technology and engineering LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Refan program. Phase 1: Summary report
[NASA-TH-X-71456] 01 p0009 874-10043 01 p0016 N74-11760 Porecasting of technological progress for Properties of solid polymer electrolyte long-range planning of mining operations at fluorocarbon film [NASA-TH-D-7482] coal mines 01 p0011 N74-10547 01 p0016 #74-11765 Solar energy to meet the nation's energy needs (MASA-TM-I-68290) 01 p0011 M74-10754
The use of PEP Teflon in solar cell cover Mathematical methods of optimal planning development and use of energy systems 01 pG022 N74-12693 [JPRS-60546] From scientific research to the atomic industry [JPBS-60584] 01 p0023 N74-13428 technology 01 p0012 N74-10944 [NASA-TM-X-71485] Electric vehicle battery research and development [NASA-TH-X-71471] 01 p0012 N74-10946 01 p0012 N74-10946 The multiple junction edge illuminated solar cell [NASA-TN-I-71476] 01 p0012 N74-10947 KANNER (LEG) ASSOCIATES, REDWOOD CITY, CALIP. Present air pollution situation in Kawasaki city Figure-of-merit calculation methods for organic heat-pipe fluids and future countermeasures 01 p0015 x74-11736 (NASA-TH-X-2945) 01 p0018 N74-12321 Emission calculations for a scramfet powered hypersonic transport [NASA-TH-I-71464] 01 p0018 N74f KS-271 01 p0018 874-12445

OKLAHOMA UNIV., MORNAW.

Manergy: An energy management model of the
United States for the prediction of energy
demand, resource consumption, environmental Feasibility of space disposal of radioactive BASINITE VI Space disposal of tautous number of number waste. 1: Executive summary [BASA-TH-X-2911] 01 p0025 N74-14533 Effect of water injection on mitric oxide emissions of a gas turbine combustor burning effects, the assessment of new technology, and natural das fuel energy resource alternatives [NASA-TH-X-2959] 01 p0025 N74-14651

Method of making silicon solar cell array
[NASA-CASE-LEW-11069-1] 01 p0027 N74-14784

The NASA-TH-X-714911 01 p0028 N74-14788 INASA-TM-X-29591 01 p0026 N74-14665 OLD DOMINION UNIV., BORFOLK, VA. The energy dilemma and its impact on air transportation [NASA-CR-1359931 01 p0015 N74-11742 NATIONAL AFRONANTICS AND SPACE ADMINISTRATIONAL ARSHALL SPACE FLIGHT CRUTER, HUNTSYILLE, ALASOLAR energy power system
(NASA-CASE-MFS-21628-1] 01 p0025 N7 The energy situation 01 p0016 N74-11744 The air transportation/energy system [NASA-CASE-MFS-21628-1] 01 p0025 N74-14496

HATIONAL AVIATION FACILITIES EXPENIMENTAL CENTER,
ATLANTIC CITY, N.J.

Aircraft fuel system tests with gelled
fuel-flowmeter calibration, fuel bocst pump 01 p0016 N74-11745 Energy conservation and air transportation 01 p0016 N74-11746 An initial step: A demonstration project 01 p0016 N74-11747 THEIT-LOWBETER CHILDTATION, THEA DOCST PUMP and jettison tests [FAA-MA-73-43] 01 p0017 N74-1182 NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C. Energy conservation through effective utilization Conclusions and recommendations 01 p0017 N74-11828 01 p0016 874-11748 OWERS-ILLINOIS, INC., TOLEDO, OHIO.
Exploratory development of a glass ceramic [NBSIR-73-102] 01 p0027 #74-14688 automobile thermal reactor NATIONAL COMMISSION ON MATERIALS POLICY. [NASA-CR-134531] 01 a0019 N74-1200a PASSINGTON, D.C.
Compendium of university forums of the National Commission on Materials Policy, May - June 1972. A background document. NCMP forum on Technological Innovation in the Production and Otilization of Materials at Pennsylvania State PARENTE (ROBERT B.), LOS ANGELES, CALIF.
Power source quality 01 p0019 N74-12635 University, on 19-21 June 1972 [PB-223679/2GA] PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. 01 p0025 N74-14251 Interdisciplinary applications and interpretations of BRTS data within the Compendium of University forums of the National Commission on Materials Policy, May - June 1972. A background document: University Forum Susquehanna River Basin (resource inventory. 19/2. A Dackground document: University Forum on National Materials Policy, Massachusetts
Institute of Technology on 30 May - 2 June 1972
[PB-223678/4GA] 01 p0029 N74-15290
NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC., NEW land use, and pollution) 01 p0013 N74-11182 PENNSTIVABLA UNIV., PHILADELPHIA.
Solar heat utilization in residential heating systems 01 p0019 N74-12664 Energy consumption and gross national product in POLYTECHNIC INST. OF BROOKLYN, N.Y. the United States: An examination of a recent change in the relationship The synchronous EFD device 01 p0024 N74-13759. 01 n0030 N74-15681 PRATT AND WHITNEY AIRCRAFT, BAST HARTFORD, CONS. NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA Air mobility fuel cell study CONTARTO) . [AD-766757] 01 p0022 N74-12742 Investigation of silicon photoelectric cells as The 1.5-kW fuel cell powerplant precision photodetectors FAD-767302] 01 p0022 N74-12744 [NRC-TT-1686] 01 p0010 N74-10199 PRATT AND WHITNEY AIRCRAFT, SOUTH WINDSOR, CONN. Quarterly bulletin of the Division of Mechanical Engineering and the National Aeronautical Establishment, 1 July - 30 September 1973 [DME/NAE-1973(3)] 01 p0023 N74-1367 Study of fuel cell system for powered balloon 01 p0009 N74-10083 01 p0023 N74-13673 Energy in transportation 01 p0023 N74-13675 RAND CORP., SANTA MONICA, CALIF. Energy demand and its effect on the ennvironment NEW SOUTH WALES DELY., KENSINGTON (AUSTRALIA). Energy situation and nuclear power [NP-19838] FP-5048] 01 p0017 N74-11790 01 p0029 N74-15391 Energy trends and their future effects upon transportation \circ FP-50461 01 p0017 N74-11791 Energy policy research and the State of Florida
[P-5078]
01 n0026 N74-10 OAK RIDGE NATIONAL LAB., TRHN. 01 p0026 N74-14684 Second iteration analysis of a fossil fuel-fired Residential energy use: An econometric analysis gas turbine-potassium-steam combined cycle [ORNI-NSF-EP-39] (8-1297-NSF) 01 p0032 N74-15698 01 p0019 N74-12577 RESEARCH INST. OF NATIONAL DEPENCE, SUNDBIBERG An inventory of energy research, volume 1 01 p0021 N74-12688 (SWEDEN) . Combustion of the gases methane, LP gas and An inventory of energy research, volume 2 ammonia in a mixing reactor 01 p0021 N74-12689 FOA-1-C-1442-H3] 01 p0022 N74-12824 Energy research and development: A selected ROCKETOYNE, CAMOGA PARK, CALIF.
Investigation of chemical APU application for reading list [ORNL-EIS-73-65-REV-1] 01 p0022 N74-12695 small ground power sources Isotope kilowatt program (ORNI-TM-4243) TAD-7657241 01 p0009 N74-10082 01 p0025 N74-14377 Electric energy requirements for environmental protection [CONF-730205-4] 01 p0027 N74-14695 SANTA CLÁRA UNIV., CALIP. Storage and transportation of synthetic fuels. Electric energy requirements for environmental protection A report to the synthetic fuels panel [ORNL-TM-4307] 01 p0030 N74-15448 [CONF-730205-4] Prospects for hydrogen as a fuel for transportation systems and for electrical 01 p0027 N74-14695 SCIENTIFIC TRANSLATION SERVICE, SANTA BARBARA, CALIF power deneration [ORNL-TM-4305] Oil exploration subprogram geological 01 p0030 N74-15449 OFFICE OF NAVAL BESEARCH, LONDON (ENGLAND). interpretation of images provided by the

ERTS-A satellite

[NASA-TT-F-152651

[AD-7603421

MHD for power generation: The view of a chosen

01 p0025 N74-14408

CORPORATE SOURCE INDEX

SELECT COMMITTEE ON SMALL BUSINESS (U. S. HOUSE). Energy crisis and small business 01 pG027 N74-14691 SERVICIO GEOLOGICO DE BOLIVIA, LA PAZ.
Petroleum exploration subprogram: Geological interpretation of proportional imagery from EBTS-A satellite [874-10213] 01 p0028 N Oil exploration subprogram geological interpretation of images provided by the 01 p0028 N74-15020 ERTS-A satellite 01 p0028 N74-15070 [NASA-TT-P-15265] [MASA-TT-F-15265]
SOUTHERN HETBODIST UNIV., DALLAS, TEX.
Development of qeothermal reservoirs from
over-pressured areas beneath the Guif coastal
plain of Texas. A feasibility study of power
production from overpressured reservoirs
[AD-76685]
[AD-76685]
TANNOON PRESSURE TOWNS AND TOWNS [AD-766855] 01 p0018 F74-12183
STANFORD RESPARCH INST., ARLINGTON, VA.
Legal considerations and constraints on US
nuclear police nuclear policy [AD-754641] 01 p0024 H74-13697 STATE OF OHIO DEPT. OF DEVELOPMENT, COLUMBUS. Relevance of ERTS to the State of Ohio (E74-10024) 01 p0013 N 01 p0013 N74-11159 SYDMEY UNIV. (AUSTRALIA).
Alternative energy sources: A research challenge (CONF-730560-1) 01 p0024 N74-1405 01 p0024 N74-14097 TECHTRAN COMP., GLEM BURNIE, MD.

Economics of air transport
(NASA-TT-F-15249]
TEMMESSEE UMIV., RMOIVILLE.
Strip-mined watershed hydrologic data 01 p0026 N74-14682 acquisition study [PB-223558/8GA] 01 p0025 N74-14105 TRIAS INSTRUMENTS, INC., DALLAS.

BRIS-1 imagery use in reconnaissance prospecting: Evaluation of the commercial utility of ERTS-1 imagery in structural reconnaissance for minerals and petroleum 01 p0013 N74-11148 FE74-100071 W WESTINGHOUSE BLECTRIC CORP., EAST PITTSBURGE, PA.
The effect of fuel availability on future B and
D programs in power generation 01 p0031 N74-156B9 WOLP RESEARCH AND DEVELOPMENT CORP., POCOMORE CITY, Applicability of Skylab remote sensing for detection and monitoring of surface mining activities 01 p0024 N74-14028 [E74-10160] WYOHING UNIV., LARAMIE.

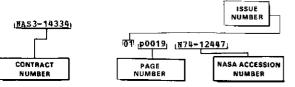
Low energy gas utilization in combustion gas 01 p0029 N74-15447 X

REBOX, BOCHESTER, N.Y.
Refurbishment of solar simulation optical train
mirror assemblies
[NASA-CB-134123] 01 p0018 N74-12016

CONTRACT NUMBER INDEX

NERGY / A Continuing Bibliography (Suppl. 01)

ypical Contract Number Index Listing



istings in this index are arranged alphanumerically by contract number. Under each contract number, the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged n ascending order with the IAA accession numbers appearing first. The coession number denotes the number by which the citation is identified in either the IAA or STAR section. Preceding the accession number are the issue nd page number in the particular supplement in which the citation may be

ound. F PROJ. 683H 01 p0022 N74-12742 F PROJ. 3144 01 p0011 N74-10681 F PROJ. 6665 01 p0009 N74-10083 F PROJ. 9800 01 p0012 N74-10949 F-AFOSR-72-2299 01 p0006 A74-17905 RO PROJ. PF226 01 p0017 N74-11852 RPA ORDER 2184 01 p0018 N74-12183 DA PROJ. 1G6-63702-DG-10 01 p0022 N74-12744 01 p0024 N74-13766 DA PROJ. 1T0-61102-A-34A 01 p0010 N74-10085 01 p0013 N74-10951 DA PROJ. 116-62705-A-012 01 p0010 N74-10086 DAAK02-70-C-0518 01 p0022 N74-12744 DAAK02-71-C-0397 01 p0024 N74-13766 DAAK02-72-C-0084 01 p0013 N74-10951 DAAK02-72-C-0247 01 p0010 N74-10086 DAAK02-72-C-0424 01 p0009 N74-10082 DAAK02-73-C-0084 01 p0010 N74-10085 DAHC19-71-C-0001 01 p0024 N74-13697 DI-14-31-0001-3843 01 p0025 k74-14105 EPA-68-01-0430 01 p0011 x74-10747 PAA PROJ. 181-520-020 01 p0017 N74-11828 PSTC PROJ. T7023012301 01 p0011 N74-10874 P19628-73-C-0139 01 p0009 ¥74-10083 F29601-72-C-0083

01 p0022 N74-12742

01 p0009 N74-10078

01 D0013 N74-10952

01 p0013 N74-10952

01 p0005 A74-14892 NASA ORDER 5-70243-AG

01 p0014 N74-11188

01 p0012 N74-10948

01 p0028 N74-15070

01 p0026 N74-14682

GS-00-DS-(P)-94008 01 p0018 x74-11941 JPL-953680

NASA ORDER L-58514

NAONR-16-73

NAONE-19-72

NASW-2482

NASW-2485

NAS3-14334 01 p0019 N74-12447 NAS3-15826 01 p0002 A74-12242 NASS-21735 01 p0018 N74-12119 NASS-21782 01 p0013 N74-11159 NAS5-21795 01 p0014 N74-11195 NAS5-21796 01 p0013 N74-11148 NASS-21876 01 p0023 N74-13051 NAS5-23133 01 p0013 N74-11182 NAS7-100 01 p0009 N74-10078 01 p0027 N74-14785 NAS9-11461 01 p0018 N74-12016 NAS9-13310 01 p0024 N74-14028 NGL-17-004-024 01 p0024 N74-14093 NGL-44-005-114 01 p0014 N74-11728 NGR-10-005-022 01 p0009 N74-10075 NGR-11-002-145 01 p0002 A74-13234 NGR-33-016-131 01 p0006 A74-18797 NGT-01-003-044 01 p0020 N74-12674 NGT-44-005-114 01 p0014 N74-11727 NGT-47-003-028 01 p0015 N74-11743 NR PROJ. 9800 01 p0013 N74-10950 01 p0017 N74-11795 01 p0017 N74-11796 NSF GI-44 01 p0032 N74-15698 NSF GT-29726 01 p0030 N74-15667 GI-32488 01 p0019 N74-12462 01 p0025 N74-14499 NSF-IA-AAA-R-479 01 p0022 N74-12695 N00014-73-C-0039 01 p0012 N74-10949 p0013 N74-10950 RP0180206 01 p0013 N74-10952 01 p0013 N74-10952 SRI PROJ. 8974 01 p0024 N74-13697 W-7405-ENG-26 01 p0019 N74-12577 01 p0022 N74-12695 01 p0025 N74-14377 **MAY 1974**

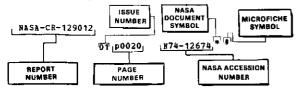
01 p0030 N74-15448 01 p0030 N74-15449 9-7405-ENG-36 01 p0022 N74-12696 9-7405-ENG-48 01 p0023 N74-13537 01 p0023 N74-13538 501-04-03-03 01 p0019 N74-12448 501-24 01 p0025 N74-14651 502-25 01 p0011 N74-10547 503 - 3501 p0015 N74-11736 739-70 01 p0009 N74-10043 01 p0025 N74-14533

REPORT/ACCESSION NUMBER INDEX

ENERGY / A Continuing Bibliography (Suppl. 01)

MAY 1974

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The issue and page number indicate the actual Supplement and page where the citation may be located. The accession number denotes the number by which the citation is identified. An asterisk $\binom{\bullet}{1}$ indicates that the item is a NASA report. A pound sign $\binom{\bullet}{2}$ indicates that the item is available on microfiche. A plus sign $\binom{\bullet}{1}$ indicates a document that cannot be microfiched but for which one-to-one fasimile is available.

AD-754641	01	p0024	N74-13697	ŧ
AD-754703	01	D0010	N74-10128	#
RD /54/05 CLECKED		D0010	N74-10084	#
	01	p0011	N74-10751	
AD-756810		p0011	N74-1440B	÷
AD-760342	-		N74-1440B	Ī
AD-760395	01	p0011		-
AD-765724	01	p0009	N74-10082	# '
AD-765753	01	p0012	N74-10898	#
AD-765845	01	P0009	N74-10080	#
AD-765933	01	p0011	N74-10681	*
AD-766232	01	p0017	N74-11852	#
AD-766253	01	00009	N74-10083	#
AD-766312	01	D0010	N74-10086	
	οı	p0010	N74-10085	
	ŏi	p0013	ท74-10951	#
AD-766329	01	p0013	N74-10950	#
AD-766493			N74-10950	#
AD-766500	01	p0012		_
AD-766588	01	p0013	N74-10952	#
AD-766757	01	p0022	N74-12742	
AD-766855	01	p0018	N74-12183	*
AD-766969	01	p0014	พ74-11519	*
AD-767302	01	00022	N74-12744	#
AD-767402	01	p0024	N74-13766	
AD-101402	• •		• • • • • • • • • • • • • • • • • • • •	
AEDC-TR-73-115	01	p0017	N74-11852	
AKDC-TK-/3-113	٠.			
APCRI-TR-73-0447	01	p0009	N74-10083	
AFCBL-TR-73-0447	٠,	poods	117 10000	•
		0040	N74-12183	£
APOSE-73-1344TE	01	p0018	M/4-12103	•
AFWL-TR-73-26	01	p0022	N74-12742	#
ATAA PAPER 73-1105	01	p0002	A74-12242	
ATAA PAPER 73-1113	01	p0001	A74-10691	*
AIAA PAPER 73-1168	01	p0001	A74-11219	#
AIAA PAPER 73-1232	01	p0001	A74-11257	#
1040	01	p0006	a74-17905	ŧ
	01	D0002	A74-11315	*
	01	p0006	A74-18797	
AIAA PAPER 74-160	01	p0006		
AIAA PAPER 74-162	VI	puovo	#14-10130	•
		- 0043	MAD 40067	#
ANL-ENG-73-02	01	p0013	N74-10952	*
				_
APTD-1357	01	p0011	N74-10747	#
APTIC-47644	01	p0018	ห74-12321	*
**				
ARO-PUT-TR-73-75	01	D0017	ั ห74−11852	
ANO 141 IL		, • •	•	
ASME PAPER 73-WA/GT-2	01	D0002	A74-13293	. #
WANT AND	٠.	P4402		_
BM-TC-9200-SUPPL	0.4	p0032	N74-15691	#
BM-IC-8240-SUPPL	01	PUU32	7.14 1202	

BK-IC-8534	01 p	0032	N74-15691 #
			N74-10129 #
BM-RI-7756	01 p	0010	N74-10129 # N74-10715 #
BM-RI-7806	01 F	,0011	Midelovia a
mpp 33	01 p	0018	N74-12159 #
BM-TPR-73	٠, ,	,,,,,,	
BMFT-FB-T-73-02	01 6	0015	N74-11739 #
Dari-18-1-73-02			
BMPR-7	01 p	0023	N74-13051*#
CIRC-650	01 ;	00031	N74-15685 #
. = .	01 T	0027	N74-14695 #
CONP-730205-4		00027	N74-12696 #
CONF-730440-1		0024	N74-14097 #
CONF-730560-1		00023	N74-13538 #
CONF-)5 002-1 2:000	'		
DFVLR-SONDDR-301	01 1	6000q	A74-18925
DI VIII		_	
DGLR PAPER 73-092		p0005	A74-17195 #
DGLR PAPER 73-107	01 7	p0005	A74-17204 #
	n.4		N74-13673 #
DHE/NAE-1973(3)	01	p0023	# C10C1 P1H
	01	p0011	N74-10547*#
E-7536		p0025	N74-14651*#
E-7565		p0023	N74-10754*#
E-7625		00015	N74-11736*#
E-7632		p0025	N74-14533*#
E-7679		p0009	N74-10043**
E-7749		p0018	N74-12445*#
E-7772		p0012	N74-10946*#
E-7795		p0012	N74-10947*#
E-7813		p0012	N74-10944*#
E-7828	01	p0028	N74-14788*#
D , O ,			
EOS-1155	. 01	p0018	N74-12016*#
EQL-7	. 01	0E00q	74-15667
			x74-13766 #
ERC-0397F		p0024	
ERC-0959F		p0010	
ERC-00845	. 01	p0010	M14-10003 #
	. 01	p0013	N74-11148*#
E74-10007		p0013	
E74-10024		p0018	
E74-10029		p0013	
B74-10061	- 11	p0014	
E74-10083		p0014	
E74-10083		p0023	
E74-10160		p0024	
E74-10213		p0028	
	•		
PAA-NA-73-43	. 01	p0017	N74-11828 #
FAA-RD-73-138	. 01	p0017	N74-11828 #
	ρ.4	-0000	N74-12824 #
POA-1-C-1442-H3	. 01	p0022	N/4-12824 #
	0.4	-0017	N74-10898 #
FSTC-HT-23-1016-73		p0012 p0011	
FSTC-HT-23-1248-72		p0010	
PSTC-HT-23-1275-72	:	p0010	, 11,4 1000
PSTC-HT-23-1838-72	. 01	p0009	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
F310=01-23-2040-72	- 01	P-00.	
FTD-HT-23-702-73	. 01	p0014	N74-11519 #
5.TD-#T-63 iA* i3 #446644444	'		
FTD-HT-24-287-72	. 01	p001	
FTD-HT-24-1737-72		p001	
	- 01		
	. 01	,	
IGU/A-1-73		р002	5 N74-14666
IGU/A-1-73ITR-3	. 01	-	5 N74-14666 3 N74-10951 #

REPORT/ACCESSION NUMBER INDEX

JPL-TM-33-621	. 01 p0027 N74-14785*#
JPL-1200-59-VOL-1	, 01 p0023 N74-13466*#
JPL-1200-59-V01-2	. 01 p0023 N74-13467*#
anne cortec	
JPBS-60546	
JPRS-60584	. 01 p0023 N74-13428 #
KS+27	04 .0045 HEL .0044
NO-21	01 p0018 N74-12321 #
L-8152	01 p0019 N74-12448*#
_ 0102	4 484421 4124 6100d
LA-UR-73-570	01 p0022 N74-12696 #
	1. P. 200
LBL-1773	01 p0023 N74-13538 #
LRP-63/73	01 p0010 N74-10391 #
870-400-bpg 4	
M72-180-REV-1	01 p0032 N74-15695 #
NASA-CASE-LEW-11069-1	04 -0027 274 4270
NASA-CASE-LEW-11069-1	01 p0027 N74-14784*
NASA-CASE-MPS-21628-1	01 p0025 N74-14496*#
	01 b0023 374-14430+#
NASA-CR-129012	01 p0020 N74-12674*#
NASA-CR-134123	01 p0018 N74-12016*#
NASA-CR-134519	01 p0009 N74-10075*#
NASA-CR-134531	01 p0019 N74-12447*#
NASA-CR-135816	01 p0014 N74-11188*#
NASA-CR-135848	01 p0013 N74-11148*#
NASA-CR-135865	01 p0013 N74-11159*#
NASA-CR-135870	01 p0018 x74-12119*#
NASA-CR-135961	01 p0013 N74-11182*#
NASA-CR-135972	01 p0014 N74-11195*#
NASA-CR-135981	01 p0009 N74-10078*#
NASA-CR-135993	01 p0015 N74-11743*#
NASA-CR-135995	01 p0014 N74-11727*#
NASA-CR-136007	01 p0014 N74-11728*#
NASA-CR-136169	01 p0023 N74-13051**
NASA-CR-136191	01 p0019 N74-12462*#
NASA=CR-136197	01 p0023 N74-13466*#
NASA-CR-13619B	01 p0023 N74-13467+#
NASA-CR-136287	01 p0024 N74-14028*#
NASA-CR-136472	01 p0024 N74-14093*#
NASA-CR-136476	01 p0028 N74-15020*#
NASA-CR-136552	01 p0027 N74-14785*#
Naga	
NASA-TH-Y-2895	01 p0019 N74-12448*#
NASA-TM-X-2911	01 p0025 N74-14533*#
NASA-TM-X-2945	01 p0015 N74-11736*#
NASA-TM-X-2959	01 p0025 N74-14651*#
NASA-TM-X-68290	01 p0011 N74-10754*#
	01 p0009 N74-10043*#
Waca-me w Sauna	01 p0018 N74-12445*#
NASA-TH-X-71471	01 p0012 N74-10946*#
NASA-TH-X-71476 NASA-TH-X-71485	01 p0012 N74-10947*#
	01 p0012 N74-10944*#
NASA-TM-X-71491	01 p0028 N74-14788*#
NASA-TN-D-7482	01 p0011 N74-10547*#
	01 p0011 8/4-1054/*#
NASA-TT-F-15184	01 p0012 N74-10948*#
NASA-TT-F-15249	01 p0026 N74-14682*#
NASA-TT-F-15265	01 p0028 N74-15070*#
NBSIR-73-102	01 p0027 N74-14688 #
WOME OF C	01 p0029 N74-15290 #
NCMP-UF-6	01 p0025 N74-14251 #
NMAB-297	
NDAB-29/	01 p0018 N74-11941 #
NP-19838	01 -0000 474 45004 4
	01 p0029 N74-15391 #
NRC-TT-1686	01 p0010 n74-10199 #
	v. poulo 8/4-10/99 #
NSF-RA/N-73-004	01 p0025 N74-14499 #
	H14-14432 #
NSF-RANN-71-1-2	01 p0017 N74-11795 #
	01 p0017 N74-11796 #
NAT (D) 40 A	
N5F/RA/N-73-001	01 p0019 N74-12462*#
	·-· •
ONE-TR-20	01 p0012 ¥74-10949 #
•	
ONBL-C-10-73	01 p0025 N74-14408 #
ORNL-EIS-73-65-REV-1	
AND MYD-13-03-KUA#1 *********	01 p0022 x74-12695 #

ORNL-NSF-EP-39	01	p0019	N74-12577 #
ORNL-TM-4243	01	p0025	P76 40555
	, U I		N74-14377 #
			N74-15449 #
ORNL-TM-4307	01	p0030	N74-15448 #
ORSER-55EL-TR-9-73	01	p0013	N74-11182*#
OWER-A-030-TENN(1)	01	p0025	N74-14105 #
P-5046		p0017	N74-11791 #
P-5048	01	p0017	N74-11790 #
P-5078	01	p0026	N74-14684 #
PB-207518	01	p0017	N74-11795 #
PB-207519		p0017	
	01	p0019	N74-12462*#
		p0018	N74-11941 #
PB-222609/0		p0010	N74-10129 #
PB-222849/2	01	p0011	N74-10747 #
PB-223326/0GA	01		N74-14791 #
PB-223536/4GA			
PB-223558/8GA			
			N74-14105 #
		p0029	N74-15290 #
PB-223679/2GA	01	p0025	N74-14251 #
PWA-4635	01	- 0000	W74 4050 -
			N74-12742 #
			N74-12744 #
PWA-4792	01	p 00 09	N74-10083 #
QPR-3	01	p0024	N74-14028*#
QR-1	01	p0026	N74-14686 #
R-679-5	01	0044	
	•••••• 01		N74-10747 #
R-1297-NSF R-9284			N74-15698 #
B-9284	01	p0009	N74-10082 #
REPT-73SD231	01	P0012	N74-10949 #
REPT-732-015-1	01		N74-10078**
		P0003	M/4-100/0+#
RR-35	01	р0025	N74-14105 #
S-REPT-93-526	01	p0027 1	N74-14693 #
SAR-15	01	D0009 1	N74-10075*#
			10073°#
SSC-TN-8974-68		p0024 1	N74-13697 #
TID-26342	01	p0017 1	N74-11851 #
UCID-16317	01	p0023 t	874-13537 #
US-PATENT-APPL-SN-83816	01	50027 -	770407064
			174-14784* 174-14496*#
HC-Dimbum diage of co-			
		p0027 K	174-14784*
US-PATENT-CLASS-29-588	01		174-14784*
			774-14784*
-			
	01	p0027 N	774-14784*
01-702700-2	01	p0013 N	174-11148*#
W73-14368	01	p0025 N	174-14105 #